March 10, 1958
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FIRST ANNUAL ARMY AVIATION ISSUE

AMERICAN AVIATION

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MARCH 10, 1958—VOL. 21, NO. 21

AMERICAN AVIATION

WORLD'S LARGEST AVIATION PUBLISHERS

Contents

Army Aviation Features

PHOTO CREDITS

Lycoming, pp. 59, 62, 63; Chrysler, p. 65; Piasecki, p. 66; Aerophysics, p. 67.

Coming next issue . . . AMERICAN AVIATION'S special theme supplement on *Aircraft Systems & Accessories* highlighting a complete accessory report on the five leading U.S. jet and turboprop transports.

Two Handicaps Stifle Army Aviation's Growth

ARMY AVIATION is no longer an illusion, it's a fact. Ample evidence of its growing importance is to be found in this first annual issue of AMERICAN AVIATION devoted to the subject.

In terms of units, although not in dollars, the Army is becoming the major buyer of airplanes and rotary-wing aircraft. In a sense, it is picking up where USAF left off twenty years ago when USAF was itself a part of the Army. It is expanding its aviation activities on the sound basis that if it survives as a major service, it must become mobile in the air.

But Army Aviation has two major handicaps today.

One is the vast muddle of organization within the Department of the Army. It would be impossible to draw up an organization chart that truly reflects aviation's role in the service. The organizational setup is so complex that one wonders how aviation has been able to get started at all.

The answer is, as always, that progress has been made because of a group of devoted and dedicated men fighting for what they believe to be right, operating under a ponderous higher echelon command of many uninterested and uninformed bosses. In many respects it is a repetition of the old Army Air Corps, which finally burst into its own as USAF as a result of the dominance of air power in World War II.

Thus, before Army Aviation can become as important as it needs to be, the Department of the Army must set its own organizational house in order. It needs both a Deputy Chief of Staff for Missiles and Deputy Chief of Staff for Aviation. It must disentangle itself from the unbelievably burdensome and cumbersome Continental Army Command with all of its over-riding authority.

CONARC has often been called the burial ground of white elephants. It is known as the home of aging generals waiting out retirement. Thus it is hardly the proper place for decisions on crucial Army Aviation matters. Such a setup held back the Army Air Corps for many years; it will hold back its own Army Aviation in like manner.

The second handicap is one that has been in the limelight off and on for the past decade—the Defense Department decree that the Army must order aircraft through USAF procurement. It's about time to untie Army Aviation from USAF apron strings and let it grow on its own.

By a strange irony of circumstances, lower echelon USAF personnel are now doing to Army Aviation what the land-minded Army used to do in pre-World War II days to its own Air Corps. USAF personnel are over-riding Army Aviation decisions on important equipment matters to a ridiculous degree.

The record clearly shows that Army Aviation has *never* taken delivery of an "acceptable" airplane that was built to the USAF Handbook of Specifications. The *only* satisfactory aircraft or helicopters now in operation by Army Aviation *were designed for civil certification*. Army Aviation should not be interlocked with USAF or Navy in such equipment projects. The superior and less expensive method is for Army Aviation to utilize CAA airworthiness certification standards. (If USAF itself had followed CAA standards for such airlift equipment as the C-46 and C-82, to name but two models, the present costly process of putting these surplus types in civil use could have been avoided.)

The Army needs aviation. Without mobility in the air, it faces erasure as a major force. Any general who doesn't have the intelligence and foresight to recognize the need for air mobility in today's and tomorrow's world has no business being in his job and should be relieved or retired.

If Army Aviation is to grow in a sound direction, it must have the freedom to deal with contractors and to encourage these contractors to develop new types. To date the relationship between Army and contractors has not been satisfactory because of the organizational muddle.

There are good, sound, dynamic men in Army Aviation. They are articulate and they know air's place in the so-called ground service. But they must be given a chance to develop. The makings are there if the top brass will listen and understand.

Breathtaking Airlift

Here's an airlift that made history. The J. I. Case Co., manufacturer of power machinery for agriculture and industry, flew 4,200 dealers and others to Phoenix, Ariz., for a world premier of its new equipment not long ago. Twelve million passenger miles were involved. Half the people were making their first flight. More than 115 DC-6s, DC-7s and Constellations were used to transport the guests from 58 different cities in the U.S. and Canada—and not a bag was lost!

Cost to J. I. Case: $1,000,000. But over $154 million worth of goods were sold in a five-week period. The Case company was a pioneer in the use of business aircraft. It has now shown even more initiative in using the airplane to sell its products. More power and sales to Case.

Wayne W. Parrish

SPOTLIGHT

Rollout of the first Douglas DC-8 is being pushed back from April to mid-May because of delayed delivery of engine pylon hardware.

More confusion on model numbers: Army redesignation of the Bell H-40 helicopter to the HU-1A signals start of another new identification system. Army system spells out mission of aircraft or helicopter, but, unlike Navy, it does not designate the manufacturer.

Army now is soft-pedaling use of the word "Jeep" in connection with its vertical flight aircraft on grounds it might be the sole property of a motor car manufacturer (Willys). Army does not intend to infringe, and one of its contract requirements calls for suggestions for a suitable name. Only name cleared at this time is "utility vehicle."

Lockheed-Marietta representatives are quoting Northwest Airlines a $2.4-million pricetag for the C-130, with a direct operating cost of 5.9¢ a ton-mile.

Air Force Assn. poses this interesting question: Why must the U.S., which enjoys world leadership in civilian research and development, strain to match Russia in military R&D? Sooner or later, says AFA, we must treat defense work as a business, rather than an interruption of business, and bring it back into the free enterprise system, devoid of regulation, centralization, price controls and subsidization.

Flight test program for the Grumman G-159 Gulfstream turboprop executive aircraft will be carried out at the company's Stuart, Fla., facilities. First plane, due off the assembly line at Bethpage, N.Y., this spring, will be shipped to Florida for testing. Powerplants will be two Rolls-Royce Darts.

General Electric has assigned the designation X-211 to its 25,000-lbs.-plus-thrust engine being developed for the North American B-70 chemically-fueled bomber.

Sperry Gyroscope Co. is designing a very light weight Doppler navigator for Army. It will be used as the primary sensor for navigation systems, will give all-weather capability to helicopters and lightplanes. The navigator, AN-APN-118, is expected to be under development three years and to emerge as a lighter weight unit than any presently known system.

Second production Boeing 707 is scheduled to fly this week, and the third should roll out of the Renton, Wash., plant about the same time. Company says all signs point to Pan American starting jet service before year's end.

In addition to being capable of operating nearly 15 miles up (75,000 ft.) and at Mach 3 speeds (2,000 mph) North American's F-108 long-range interceptor will carry enough guided atomic missiles for multiple kills against manned bombers and certain types of guided missiles.

Navy has an off-the-shelf competition going for a twin-engine lightplane to fit into its combat readiness training program.

DeHavilland-Canada expects first flight of its DHC-4 Caribou in June. Company has mated wings to forward fuselage, and the tail section assembly reportedly is moving along on schedule. Final decision on tail design calls for a single vertical stabilizer somewhat shorter than originally proposed. Vortex generators are being added on both horizontal and vertical stabilizers.

It's generally the practice in transport manufacture for the second airplane off the line to be up for delivery, but in the case of the Lockheed Electra the first four are unassigned. They're "resident" airplanes to be used in the flight-test program and won't be made available to airlines until later.

When and Where

MARCH

IRE national convention & radio engineering show, Waldorf-Astoria Hotel, New York Coliseum, March 24-27.

International Instrument Show, Caxton Hall, London, March 24-29.

APRIL

Air Traffic Conference, spring meeting, Hotel Statler, Washington, D.C., April 8-10.

Aeronautical Training Society annual meeting, Mayflower Hotel, Washington, D.C., April 10-11.

Assn. of Local & Territorial Airlines, quarterly regional meeting, Las Vegas, April 10-11.

Federation Aeronautique Internationale, Los Angeles, Apr. 14-16.

American Helicopter Society, annual national forum, Sheraton-Park Hotel, Washington, D.C., April 16-19.

MAY

National Flight Test Instrumentation Symposium, Instrument Society of America, Park Sheraton Hotel, New York, May 4-7.

American Assn. of Airport Executives, annual business meeting and convention, Hacienda Motel, Fresno, Calif., May 4-7.

Annual Miami-Havana Air Cruise, sponsored by Florida Air Pilot's Assn. (For details contact: J. G. Pace, 310 S.E. 2nd Ave., Miami, Fla.) May 10-13.

IRE national conference on aeronautical electronics, Biltmore Hotel, Dayton, O., May 12-14.

Airport Operators Council, annual meeting, San Juan, Puerto Rico, May 12-16.

JUNE

Air Mail Pioneers anniversary ball, Beverly Hilton Hotel, Beverly Hills, Calif., June 14.

Aviation Distributors & Manufacturers Assn., 31st meeting, Mount Washington Hotel, Bretton Woods, N.H., June 25-27.

BOOKS

The Great Deterrent. *By Sir John Slessor, Marshal of the Royal Air Force. Frederick A. Praeger, Inc., New York. Price, $6.*

A collection of lectures, articles and broadcasts presented by the author, a former British Chief of Air Staff, over a period of 25 years. Prepared primarily for students of military strategy, the book is a valuable addition to military libraries.

Sir John reviews and analyzes changes in military strategy resulting from the development of mechanized warfare. The book provides, in his words, "a launching site for future strategic thinking."

The American Flight Navigator. *By John Dohm. Published by Pan American Navigation Service, North Hollywood, Calif. 352 pp. Price, $6.50.*

A concise study of methods and equipment used in international transport navigation, with emphasis on U.S. flag carriers, this is a practical book based on years of experience in overwater flying.

Can You Call a Man a "Failure" at Thirty?

Men who think that success is only a matter of "a few years" are failures . . . however young they are!

How often have you heard some young man in business say, "I'll admit the job I have now isn't much but, after all, I'm only in my twenties."

Or: "Just about every executive in the company I work for is between 45 and 65. I have plenty of time to get ahead."

This *mistaken* idea that success comes automatically with time is easy to understand. Promotions do come regularly and effortlessly to young men of promise. *But* the day arrives, often abruptly, when that promise must be *fulfilled*. Native ability and intelligence can carry a man only to the mid-way point in business—beyond that he must *prove* his capacity to justify a position of executive responsibility. That calls for a practical, working knowledge of business fundamentals.

The time to build that knowledge—to lay a solid groundwork for your future progress—is now . . . *now* while time is still on your side. If you fail to recognize that fact, you'll know only struggling, skimping and regret when your earning power should be at its height.

FOR THE BUSINESS MAN WHO REFUSES TO STAGNATE

HALF the world is half asleep! Men who could be making twice their present salaries are coasting along, hoping for promotions but doing nothing to bring themselves forcefully to the attention of management. They're wasting the most fruitful years of their business lives... throwing away thousands of dollars they'll never be able to make up.

If *you* want to discover how to start to succeed while you're still young—if you want to avoid the heartbreak of failure in later years—send today for "Forging Ahead in Business"... one of the most practical and helpful booklets ever written on the problems of personal advancement. You will discover what the qualifications of an executive are in today's competitive market... what you must know to make $15,000, $20,000 or more a year... what you must *do* to accumulate this knowledge.

"Forging Ahead in Business" was written for ambitious men who seriously want to get down to bed-rock in their thinking about their business future; there's no charge for the booklet because, frankly, we've never been able to set a price on it that would reflect its true value. Some men have found a fortune in its pages. If you feel that it's meant for you, simply fill out and return this coupon. Your complimentary copy will be mailed to you promptly.

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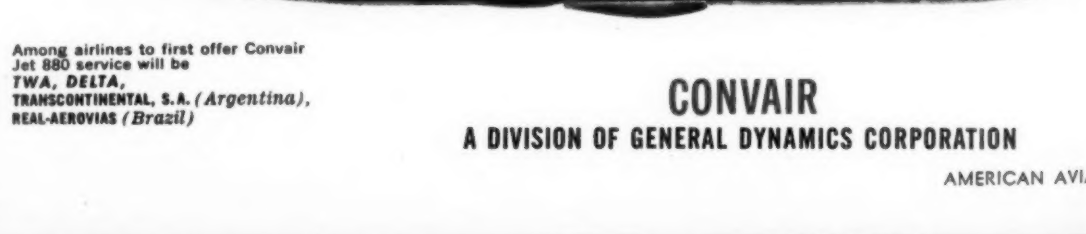
THE DE HAVILLAND AIRCRAFT OF CANADA LIMI

...the plane with the Midas touch

Fit for a king, the Convair Jet 880 has the *golden touch* of regal elegance! With dramatic new interiors, and first class, two-abreast seating throughout... the Convair Jet 880 will bring exciting and exclusive new concepts in travel luxury. In addition, the Convair Jet 880, *world's fastest luxury jet-liner,* offers airlines low operating cost, economy of maintenance, and ability to serve big city and small. For both passengers and airline operators alike, this is *the plane with the Midas touch!*



Among airlines to first offer Convair Jet 880 service will be
TWA, DELTA,
TRANSCONTINENTAL, S.A. *(Argentina),*
REAL-AEROVIAS *(Brazil)*

CONVAIR

A DIVISION OF GENERAL DYNAMICS CORPORATION

AIRTRENDS

It's unlikely there will be a speed-up in development of nuclear-powered aircraft as proposed by USAF, despite prodding of Joint Atomic Energy Committee. This will give Navy more time to try to prove its contention that use of a nuclear-powered seaplane is more desirable than a B-52 or KC-135, as suggested by USAF.

Navy is looking into possibility of buying the Lockheed Electra or a turboprop version of Douglas DC-7 for use as anti-submarine warfare aircraft. Decision isn't likely before July 1.

USAF Source Selection Board starts work Mar. 10 on proposals of three manufacturers for the UTX small utility jet aircraft, which will be bought off-the-shelf. No affirmative action is expected before July 1. In the running are North American, Beech (offering the Morane-Saulnier 76) and Aircraft Marine, a West Coast firm.

Sharp departure from earlier mobilization policy may be in the making. USAF and industry inspection teams are eyeing the Ford-Chicago plant which has been making J57 engines for USAF. Present plans contemplate taking out those machine tools and fixtures that can be used by other manufacturers working on new and more advanced weapon systems. Earlier policy was to retain package plants for mobilization purposes.

Air Force is considering a land-based "Retaliator" version of Navy A3J carrier-based attack aircraft proposed by North American-Columbus. Both Australia and Germany reportedly have shown interest in the A3J.

TRANSPORT

DC-9 project has been revived by Douglas in a bid for a share of medium jet market. Plane will be offered with two Pratt & Whitney J75s, will gross about 125,000 lbs. Price will be $2.5 million, with 1962 delivery. There's no decision yet on building a prototype.

Return of Charles Rheinstrom to American Airlines as executive vice president-sales is biggest airline management news in a long time. He was considered one of the ablest men in airline business before he left to go into advertising. Observers are inclined to feel his return to AA will lead to more than just directing sales. He'll be in the front rank as successor to C. R. Smith as president when latter gets ready to move back up to board chairmanship.

Blunt warning to members of Congress has been issued by CAB Chairman James R. Durfee: If they appear before CAB and urge more local service routes, they must also be prepared to vote more subsidy money to support the routes. At conclusion of Seven States Area Case, Durfee noted: "I think it is significant . . . that no member of the Congress . . . stood before this commission . . . and asked for any discontinuance of service on the basis of economy. The record is clear that the contrary is true."

Early Congressional action on bill banning serving of liquor aloft by airlines has been forestalled. Senate Commerce Committee wants to hold more hearings, particularly to hear what airport managers and city officials have to say about an amendment that would extend drinking ban to all federally-supported airports. Amendment materially lessens chances for bill's passage.

INDUSTRY At Deadline

Slick quits airfreight service; Rentzel blames CAB, Pentagon

Slick Airways ceased certificated cargo operations Feb. 24, after 8½ years of service. It immediately asked the Civil Aeronautics Board to consider the cessation as a temporary suspension of service until Jan. 1, 1959.

Its reasons: finances, CAB policy and the Department of Defense.

Policies of CAB and the Defense Dept. were blamed by Delos W. Rentzel, president and board chairman, for most of the airline's ills. Slick lost over $3,114,000 in common carrier operations for the year ended June 30, 1957, and "over $1.2 million" for the period July 1, 1957 to Feb. 1, 1958.

Slick, in its petition to CAB, noted: "these losses would be serious for any carrier. They are devastating for Slick. As an unsubsidized carrier, these losses must be borne by its stockholders." The airline estimated investment of the stockholders at "over $13 million of private capital."

On Feb. 22, Slick sent separation notices to 200 of its 600 employes. Its employment last May totaled 1,800. Contract and charter work and disposal of certain aircraft will occupy the company for the time being.

Slick, meanwhile, blamed CAB for failing to exercise but little of its promotional responsibility in connection with the development of all-freight carriers as such.

Instead, Slick charged, the Board has been preoccupied with the problems of airlines, large or small, important or unimportant, who were entitled to subsidy. It has had little interest in the problems of carriers whose operations were not underwritten by the Government.

Slick also complained: "CAB has repeatedly refused to take steps which would have required the passenger carriers to operate their air freight business on a self-sustaining basis. It has permitted those carriers to subsidize freight losses first from mail pay and later from passenger profits . . ."

Slick's filing with CAB resulted in an immediate appearance of Rentzel before the House Subcommittee on Military Operations which is investigating the impact of air services of the Military Air Transport Service on private commercial carriers.

Rentzel told the group that "the Department of Defense and CAB were not particularly concerned whether we stay in business or not." He charged that the Pentagon permitted backlogs of cargo at Air Force bases while commercial planes, including five of Slick's sat idle.

CAB, meanwhile, directed its staff to make a quick, informal study of the Slick development and report back to the Board by March 6. Also, CAB notified the 30 cities located on Slick's route and the airline industry in general that comments would be accepted up through March 5.

On the basis of the staff study and comments that may be filed, CAB will then decide whether to grant the suspension request or institute proceedings to consider revocation or abandonment of the certificate.

ODM acts on write-offs, interpretation to follow

Long-delayed applications for rapid tax write-offs of aircraft facilities will now be processed, following the issuance of new rules by the Office of Defense Mobilization. Actually the new regulation, patterned after the so-called Byrd (D-Va.) amendment, will not be available for interpretation for some days.

However, according to ODM, certificates may be issued authorizing five-year write-offs for tax purposes of facilities which are to be used to produce new or specialized defense items or components, or to provide research, developmental or experimental services for the Defense Dept. or the Atomic Energy Commission.

The big question: "What constitutes new or specialized defense items or components?" In some cases, particularly in the missile area, the answers are clear. But in the case, for example, of an application for facilities to produce a new trainer, only experience will dictate the answers.

As matters now stand, Defense Dept. is anxious to support expansion programs within the limits of the Byrd amendment.

USAF considering supersonic transport; Convair, North American have plans

There is a need for development of economic high subsonic air transport of men and materiel—as well as supersonic passenger travel, if our national interests are to be served, Gen. C. S. Irvine, USAF Deputy Chief of the Air Staff (Materiel), says.

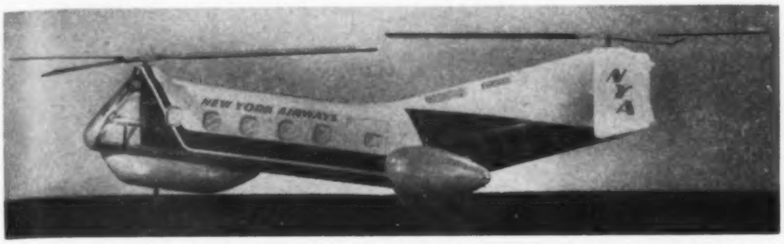
Speaking to the Armed Forces Communications Electronic Assn. in Washington, Gen. Irvine revealed that Air Force is now studying and encouraging development of such aircraft. Gen. Irvine foresees manned equipment that will progress through the high supersonic regime into the hypersonic performance areas. As for altitudes, he foresees aircraft capable at operating from sea level to the upper edges of the atmosphere and beyond.

How far projects have progressed towards development of supersonic passenger transports can be measured from current reports that Convair has submitted a proposal to USAF for a completely supersonic transport. Reportedly North American has submitted a plan for making a transport version of the WS-110A, the chemical bomber.

Doak's ducted-prop VTOL ready for hovering tests

FIRST PICTURE released of Doak Aircraft's Model 16 VTOL (AMERICAN AVIATION, Feb. 24, p. 14). Army research aircraft, powered by a Lycoming T53 turboshaft engine, is undergoing ground tests preparatory to first flight. Ducted props rotate 90 degrees in converting from vertical takeoff to normal flight. Test pilot is Edward Dietrich, front. James B. Reichert, test engineer, is in rear seat.

Vertol 44B gets CAA OK and new paint scheme



VERTOL AIRCRAFT, which cracked the civil helicopter market last month with an order by New York Airways for five of its tandem-rotor Model 44B helicopters, received formal approval of the aircraft from CAA Feb. 25. Simultaneously, NYA announced adoption of a radically new scheme of exterior marking, using a basic pattern of blue, grey and white, subdued by fluorescent rocket red "Day-Glo" lettering, striping and rotor tips. Finishing was designed by the Quantacolor Co., Inc., New York. Day-Glo is produced by Switzer Bros., Cleveland.

Rothschild explains fuel tax mathematics

How the Commerce Dept. arrived at the figures in its controversial airways-user charge plan, involving a big boost in aviation fuel taxes, has been revealed.

First explanation came last month from Louis S. Rothschild, Under Secretary of Commerce for Transportation. He told a U.S. Chamber of Commerce transportation conference in Washington that:

First, airways operating costs chargeable to the military services on the basis of physical use—"about three-eighths of the total—were deducted.

Then, as a policy matter, it was decided to recover from civil users somewhat less than 100% of their share of the cost. "Recovery is estimated from 60% at first to 80% later on," Rothschild said.

Airlines are expected to object strenuously to Rothschild's statement that military use of airways amounts to only 3/8, or 37.5%, of total. They claim the percentage should be considerably higher.

Speaking at the same meeting, Continental Air Lines president Robert F. Six said that airlines would be paying $167 million a year by 1962 under the plan. "This figure is so in excess of the most optimistic prediction of the industry's earnings as to be out of sight," he added.

Eastern expects to buy 15-25 medium jets

A $100-million order for a fleet of medium-range jet transports is planned by Eastern Air Lines sometime this year, board chairman E. V. Rickenbacker said.

Asserting that EAL will need 15 to 25 medium jets, he stated during a visit to Boeing that "offhand, without any commitment, the Boeing 720 is closer to what we think we need than is the Convair 880."

Rickenbacker said EAL hopes to begin medium jet service in mid-1961. He pointed out that Douglas also is working on plans for such an airplane, but added that "Boeing is out in front, however, in its ability to produce first."

Capital gains bill nears enactment

Anxiously-watched airline capital gains legislation moved close to final enactment following approval by the Senate. At presstime, the House was considering Senate amendments.

The bill (H.R. 5822) would clear the way for subsidized air carriers to apply the proceeds from the sale of used planes to new equipment without a subsidy penalty. The Senate version contains a controversial retroactive clause back-dating the measure to April 6, 1956.

Passage marks the climax of drawn-out efforts of the bill's supporters. There is some House opposition to retroactivity, but capital gains backers were hoping the bill would be cleared intact.

General Precision reveals details of ATC contract

General Precision Laboratory, Inc. has revealed first details of equipment it will supply under a $4.3-million contract from Airways Modernization Board. (For pilot's analyses of AMB action, see Sam Saint's column, p. 90.)

Contract calls for design, development and fabrication of the en route portion of experimental semi-automatic ATC data-processing equipment.

Equipment to be provided by GPL includes new data display consoles and computers for processing flight progress information. Also, using some devices already available from CAA developments, GPL will produce ATC center equipment for receipt, printing and distribution of flight plans to sector controllers.

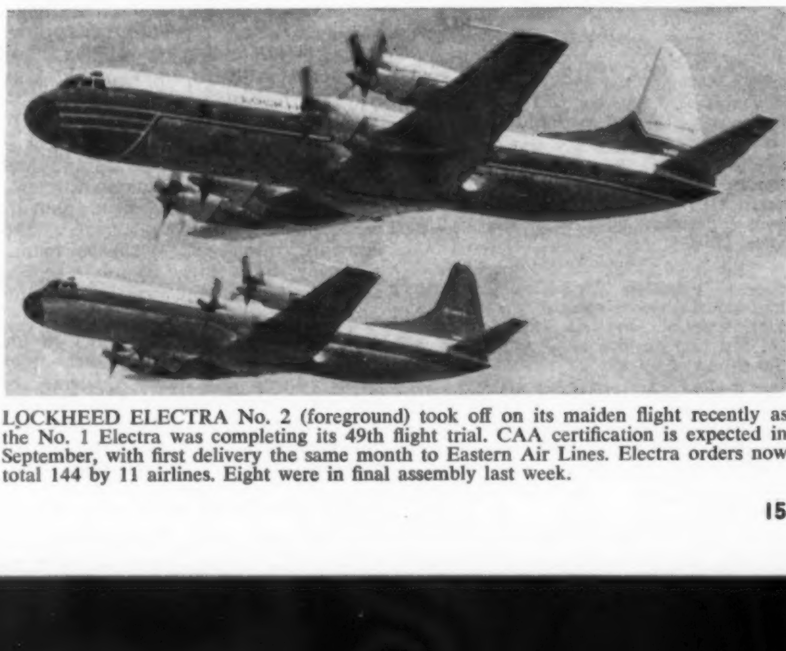
Design of the radio sector console features automatic updating of flight-progress strips while they are mounted on a controller's flight-progress board. A fail-safe feature permits manual updating if this becomes necessary.

Computers will process ATC data obtained from aircraft position reports and use this information for automatic checks on potential conflicts. If a conflict exists this information will be presented to the controller for corrective action.

Although a firm decision has not been announced on the computers to be used, it is believed these will be produced by Librascope, Inc. which, like GPL, is a subsidiary of the General Precision Equipment Corp. The Librascope computers will be operated in tandem where needed.

Howard K. Pike, 42, vp-engineering and maintenance of National Airlines, died Feb. 21 in Miami following a long illness. He had been with NAL 16 years.

Second Electra flies, only seven months until delivery



LOCKHEED ELECTRA No. 2 (foreground) took off on its maiden flight recently as the No. 1 Electra was completing its 49th flight trial. CAA certification is expected in September, with first delivery the same month to Eastern Air Lines. Electra orders now total 144 by 11 airlines. Eight were in final assembly last week.

PEOPLE

Airlines, accessory firms and airframe manufacturers all figured prominently as these big names in industry took on new assignments:

Charles A. Rheinstrom returns to American Airlines April 1 as executive vp-sales. He was vp-sales from the company's pioneer days until 1946 when he joined the J. Walter Thompson Advertising Agency, where he has been vice president several years. **O. M. Mosier** has been elected executive vp-operations for AA and **William J. Hogan** executive vp-finance and planning. Latter two have been seniors vps.

RHEINSTROM

WHITEHEAD

W. C. (Bill) Whitehead resigned as president and a director of The Garrett Corp. and has been named president of Aerol Associates, a division of Cleveland Pneumatic Industries, Inc. He was with Garrett 20 years, previously had been with United States Airlines, Century Airlines and Skyways, Inc.

J. V. Naish, executive vp, has been elected president of Convair and a senior vp of the parent firm, General Dynamics Corp., succeeding **Gen. Joseph T. McNarney,** who retires April 1.

NAISH

SCHWARTZ

Leonard Kelsey Schwartz, who resigned as director of marketing for Lockheed Aircraft Corp., has been named a vp of Hughes Tool Co.

Ruddy F. Tongg, president of Trans-Pacific Airlines since 1946, has moved up to chairman of the board. **Dr. Hung Wo Ching** succeeds him as president.

George L. Giles is new president of Riddle Airlines, succeeding **John Paul Riddle,** who was elected chairman of the board. Giles, an aeronautical engineer, has been engaged in business in Puerto Rico since 1954.

Edwin A. Link elected president of General Precision Equipment Corp. He founded and is chairman of the board of Link Aviation, Inc., a GPE subsidiary. He had been serving as vice chairman of the parent company.

Claude J. Teyssier elected president and treasurer of Sud Aviation Corp. He has been North American rep of Sud Aviation of France, of which new firm is a fully-owned subsidiary.

Surprise new contender to move jets

WITH NO advance hint of its development, Napco Industries, Inc., Minneapolis has entered this wheel-moving Turbo-Tug as its contender in the highly competitive jet transport ground handling field. Prototype was tested recently at Boeing-Seattle, using a B-52. Designed to move aircraft weighing up to 500,000 lbs. at 30 mph., this 8,000-lb. vehicle is powered by a Boeing 502-10C gas turbine. Friction drive to aircraft tires is provided by rollers located between rear wheels of mover. Boeing 502-11B turbine-powered air compressor package supplies starting for jets.

BRIEFS

Manufacturing-military

Canadair Ltd., Montreal, ordered Fairchild J83 2,000-lb.-thrust jet engines for use in its CL-41 basic pilot trainer. This is the second J83 order received by Fairchild. First was from Lockheed for its JetStar utility jet transport.

USAF has shelved, at least temporarily, a Curtiss-Wright proposal for further development of the ducted fan engine. AF says it has no present requirement for the engine.

Sud Aviation, French manufacturer, announced plans for a Super Caravelle powered by two RB141 Rolls-Royce jets, with potential delivery in 1963.

Lockheed shipped tooling for its JetStar utility jet transport to its Georgia Division, Marietta, in preparation for production when the go-ahead signal is given. USAF is now flight-testing the first prototype. Lockheed is competing with McDonnell Aircraft for the utility jet program (AMERICAN AVIATION, Feb. 24, p. 14).

Aero Materiel A/B, Stockholm, has been granted exclusive rights to market non-military products of Hughes Aircraft Co. in Denmark, Norway and Sweden.

J. K. Downer, Saginaw, Mich., acquired majority interest in Northern Aircraft Inc., Alexandria, Minn., and becomes board chairman. Roy L. Strong, founder of the firm, remains as president and general manager. The company now owns exclusive manufacturing rights to the Republic Seabee amphibian and will produce an improved version.

The study *General Review of the Titanium Metal Industry* has been prepared by National Academy of Sciences under contract with Defense Dept. Report is available to interested manufacturers at Defense Dept. or the Academy (2101 Constitution Ave., N.W., Washington, D. C.).

Defense Dept. has just bought 43 million barrels of jet fuel, 33 million from domestic sources, the balance from Caribbean suppliers. DOD at presstime was considering returning petroleum purchases to control of the "Buy American Act," passed during the 1930s.

Transport

Braniff Airways ordered more than $200,000 of Bendix equipment for its five Boeing 707s and nine Lockheed Electras. Equipment includes DFA-70B ADF receivers, RA-18C VHF receivers, MN-97 omni-mag indicators, and MKA-8A marker beacon receivers.

Delta Air Lines placed orders for more than $500,000 worth of Collins Radio airborne weather radar and communications/navigation equipment for its Douglas DC-8s and Convair 880 jets.

Convair will start major assembly of its 880 jet transport on Apr. 10. After the first jig-loading, additional planes will be started at three-week intervals and eventual production is programmed for six a month.

CAB, ruling on IATA resolutions, indicated it will approve a 5% increase in first-class air fares on South Pacific routes to and from the U.S. It also withdrew earlier opposition to a $2.50 increase in one-way first-class Miami-Havana and Miami-Nassau fares.

United Air Lines signed the Los Angeles Dodgers baseball team for 14 charter flights covering 16,710 air miles during the 1958 season.

Guy H. Evans, who has been U.S. technical representative for a number of foreign airlines, sold the assets of Guy H. Evans, Inc. to International Aviation Services, Inc. and is joining Lockheed Aircraft Corp. on Apr. 1. International, organized by Frederick Bauer, will take over Evans' offices at 6022 Wilshire Blvd., Los Angeles.

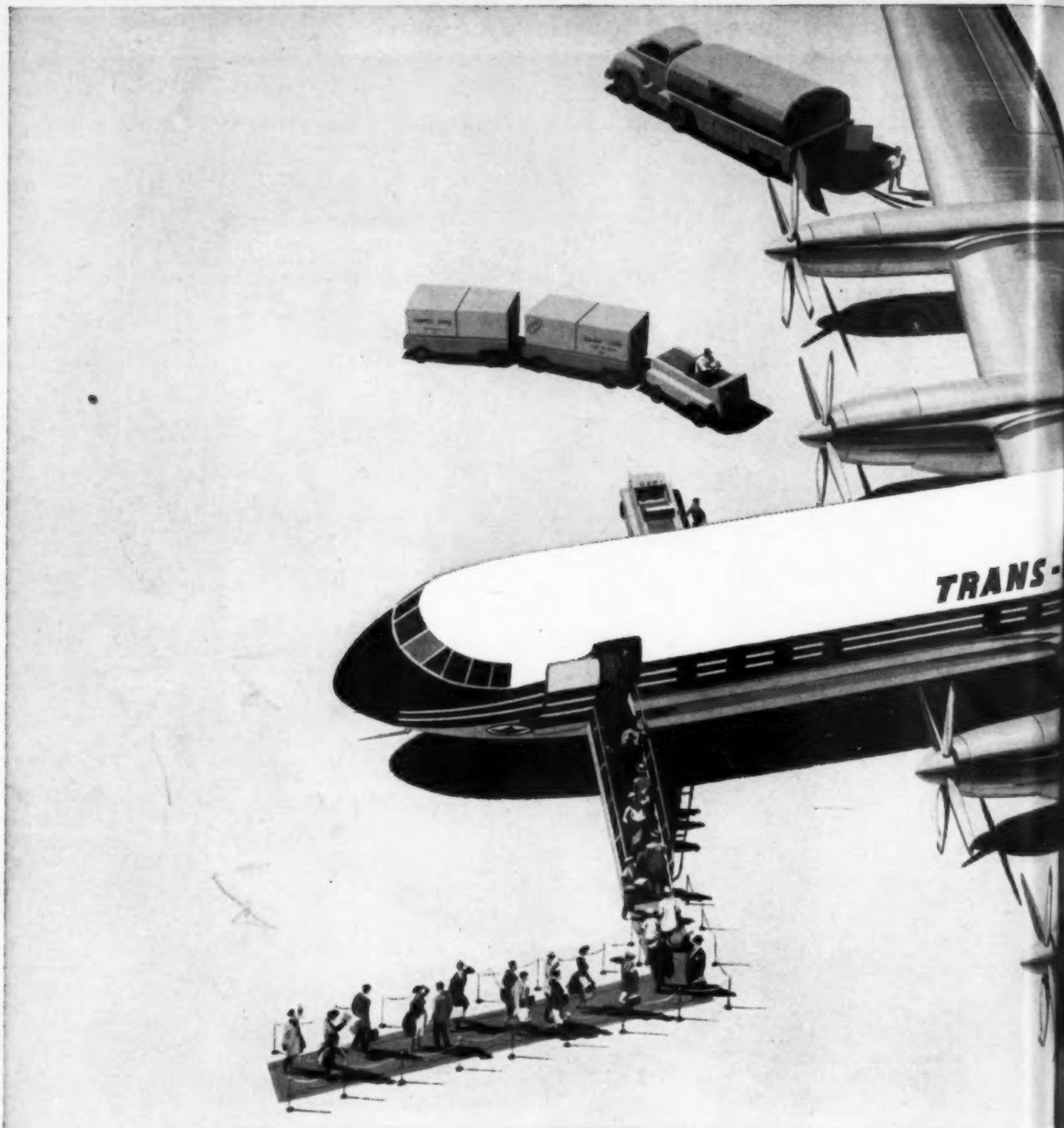
Gordon McGregor
President of Trans-Canada Air Lines

HOW TCA CHOSE THE VICKERS VANGUARD

In announcing the decision of Trans-Canada Air Lines to purchase twenty jet-prop Vickers Vanguards (with an option on four more), Mr. Gordon McGregor, President of TCA, said:

"Our decision to order the Vanguard came after the most exhaustive equipment analysis ever undertaken by the company. The evaluation was made over a period of two years, during which ten other competing aircraft were thoroughly examined."

Here are the seven reasons →



Why TCA chose the jet-prop VANGUARD as its medium-long-range airli

1. REMARKABLY LOW OPERATING COSTS.
TCA proved the Vanguard would be the most economical Jet Age airliner for its high-density, medium-range stage lengths. Mr. McGregor commented, "We expect to operate it at remarkably low aircraft and seat mile costs." Break-even load factors will be under 50% on all stages.

2. BEST OPERATIONAL FLEXIBILITY.
The Vanguard will be the most flexible Jet Age airliner. It will operate profitably on 200 to 2500 mile stages. On medium-range routes its flight time will almost parallel that of pure jets. With its well-balanced passenger and freight capacity, it will be a full-time money-maker.

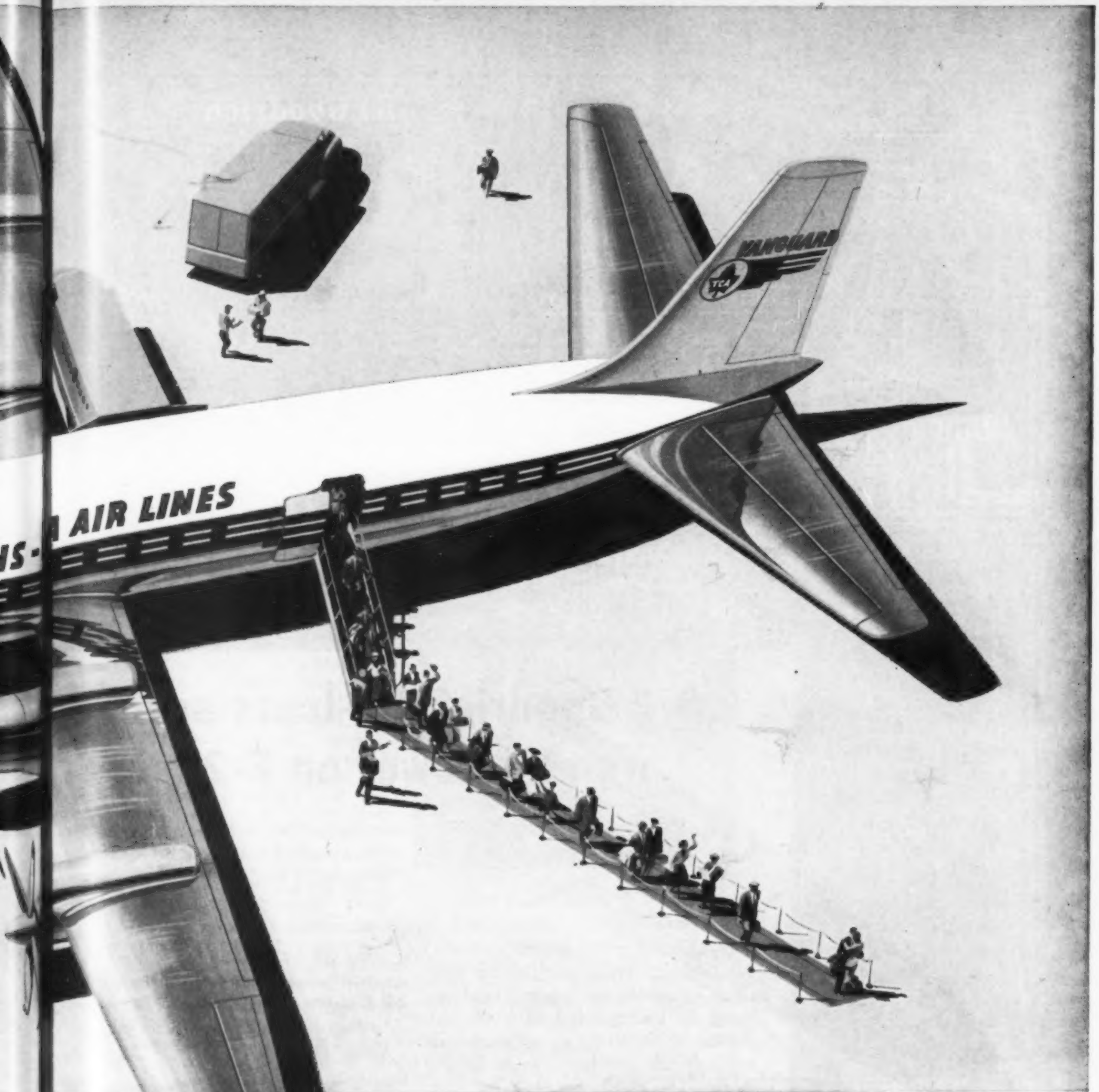
3. GREAT PASSENGER COMFORT.
Powerful Rolls-Royce Tyne engines will make the Vanguard remarkably smooth and quiet. With the very wide fuselage, there is unparalleled layout flexibility. For first class, coach and mixed-class services, the Vanguard offers the roomiest and most flexible configurations.

4. PROVEN JET-PROP ENGINEERING.
The new Vanguard is a projection of the Viscount jet-prop principle... it will come into service with the built-in experience of more than 3,000,000 hours of Viscount operation. No other Jet Age airliner will have the advantages of this extensive commercial background.

5. LESS NOISE, SHORT TAKE-OFF.
The jet-prop Vanguard will be exceptionally quiet outside as well as inside the cabin. With its short take-off run, the Vanguard, despite its great size, will be able to use the existing runways at most of today's airports. Result: great routing flexibility, high utilization.

6. LARGE FRE CAPACITY.
The Vanguard has under-floor carg (each with large, level doors) tota cu. ft. capacity. Th sents a perfect b passengers and fr ing the Vanguard b profit potential by contemporary airli

400 mph plus... 2500-mile range... up to 120 passengers... up to 10 tons of freight



QUICK TURN-AROUND
EASE OF MAINTENANCE.
Vanguard promises
air time, less ground
Check points are read-
accessible, nacelles open
major engine change is
plified. With large doors,
and aft, in both freight
passenger decks, pay-
handling is fast. Ground
maneuverability is excellent.

NEWEST from the world leader in jet-prop aircraft... VICKERS

TCA's routes and requirements are very similar to those of many American carriers. In fact, 92 of the 100 busiest routes in the U.S. can be economically served by the great new jet-prop Vanguard. A Vickers engineering team—thoroughly familiar with the problems of American lines—stands ready to answer your specific questions. If you would like them to call, at your convenience, simply contact: Christopher Clarkson, U. S. representative, 10 Rockefeller Plaza, New York 20, N.Y.

jet-prop VICKERS VANGUARD

POWERED BY FOUR ROLLS-ROYCE TYNE ENGINES

VICKERS-ARMSTRONGS (AIRCRAFT) LTD., WEYBRIDGE, ENGLAND • MEMBER COMPANY OF THE VICKERS GROUP

Circle No. 114 on Reader Service Card.

MARCH 10, 1958—VOL. 21, NO. 21

AMERICAN AVIATION

WORLD'S LARGEST AVIATION PUBLISHERS

Why the Army needs Aviation

by Wilber M. Brucker
Secretary of the Army

THE SOLDIER fights on the earth's land surface and the soldier who best adapts himself to this environment will win the war of the future. In making this adaptation, the American soldier has turned enthusiastically to the air to help solve many problems peculiar to land warfare.

Today the Army has more than 4,700 organic aircraft—fixed-wing planes and helicopters operated and maintained by the soldier—and this number will be materially increased by future procurement. These organic aircraft are specifically designed to help the soldier perform his vital battlefield tasks better than in the past. They are built to withstand the rugged field conditions under which the soldier fights. They are as much a part of his fighting equipment as the tank, truck or jeep.


SECRETARY BRUCKER

As we visualize the nature of future war, atomic or non-atomic, we see more clearly than ever the urgent need for more and better Army aircraft. Specifically, we need aircraft to move combat soldiers, their weapons, supplies and wounded more speedily and easily within the combat zone.

We need aircraft from which the soldier can observe the enemy and direct the fire of ground weapons. We need aircraft which will allow dispersed ground units to communicate with each other more effectively. We need aircraft which will permit our commanders to fly speedily to critical areas during combat and exercise on-the-spot leadership.

Army aircraft are of inestimable value in helping the soldier surmount terrain obstacles. Such obstacles, natural or man-made, have historically influenced the outcome of ground battle. Now, thanks to organic aircraft, our soldiers can cross rivers, mountains, swamps, forests and minefields in minutes instead of hours or days.

Helicopters can haul even heavy equipment and weapons into positions unattainable by ground transport. They can help lay girders and other heavy pieces for engineer bridge builders. These contributions made by Army aircraft add up to hitherto undreamed-of mobility for the soldier.

Mobility of this brand would be indispensable in the event of atomic war. It has long been obvious that dispersion of forces throughout a vast area would be the rule in such a conflict. Our Army would fight in widely separated battle groups composed of a few thousand men. In joining battle with similar enemy groups, friendly and enemy units would become inter-mingled like checkers in a game. Within the maelstrom thus created, our battle groups would have to have the ability to mass swiftly for the attack, then as rapidly disperse to minimize the effects of nuclear counterattack.

A war of such dimension would strain our communications system. Here again, the airplane can help the soldier. In our training exercises we are using Army aircraft to relay radio messages from one ground station to another, to lay wire, to move switchboards and teletype machines rapidly, to transport liaison officers and messengers. By thus improving our ability to communicate, we can achieve the coordination between combat units that modern war demands.

The need for dispersion in future war has created such unprecedented supply problems that Army logisticians are inventing new concepts for supply. The availability of Army transport aircraft has exercised primary influence in the formulation of these concepts. We envisage greatly increased reliance on these aircraft to move supplies from installations deep in the rear areas to forward units. These same aircraft can evacuate wounded on their return trips, supplementing the regular evacuation of emergency cases by Army Medical Service aircraft.

During the Korean war, we reduced the percentage of fatalities among wounded from 4.5% in World War II to 2.5%. The Army's Medical Service has not forgotten that rapid evacuation of wounded by helicopter accounted, in large measure, for this improvement. It plans to use more and better Army aircraft in the future.

We feel that the Army is just beginning to exploit the potential of aircraft. We are presenting industry with many challenging requirements. We need, for instance, aircraft better suited to take off vertically or from short, unimproved fields. Ultimately, we would like to see industry develop aerial vehicles which can hover like humming birds a few feet off the ground and dart at tree-top level through valleys and over hills.

I welcome this opportunity to tell America's aviation industry why the Army needs aviation and what it needs. For industry has met our nation's military demands magnificently in the past and I am sure it will continue to do so in the future.

MAGRUDER

MARINELLI

GRAFT

AREY

EDDLEMAN

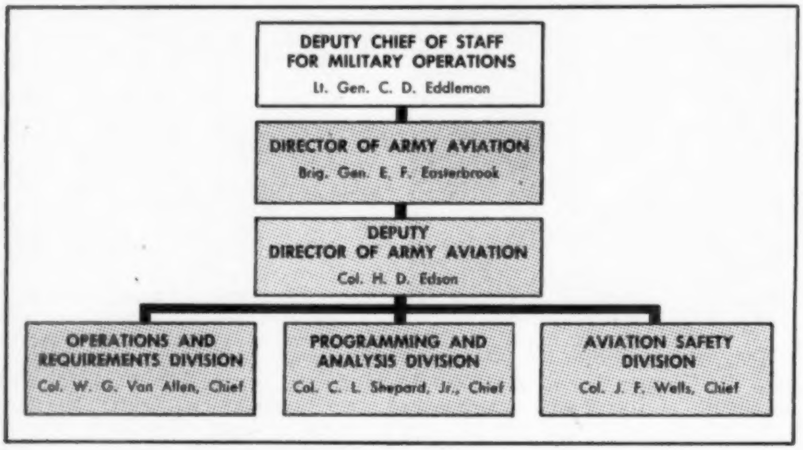
EASTERBROOK

Who's Who in Army Aviation

AVIATION in the U.S. Army is not a little air force or another air force. It is, instead, a means to an end for the ground infantry, cavalry, artillery or airborne infantry division. But the growth of aviation in the Army has been of such significance that specialists catering only to its needs have mushroomed not only throughout major organizational elements of the Army, but into its parent Defense Dept. offices as well.

Who are the specialists? Who are the officials in the Army and Dept. of Defense who are "calling the shots" that will shape Army aviation of the future? To answer these questions, AMERICAN AVIATION has compiled this *Who's Who in Army Aviation*—from Defense Secretary Neil McElroy on down the line.

Note: Telephone extensions are shown for personnel having direct Army Aviation duties. Unless otherwise shown, basic number is LIberty 5-6700, Washington, D.C.



SECRETARY OF DEFENSE—Neil H. McElroy.

ASST. SECRETARY OF DEFENSE (R&E)—Paul D. Foote.

Director of Aeronautics—T. L. Muse.

Army Aviation—Lt. Col. J. L. Klingenhagen, LIberty 5-6700, Ext. 78301.

SECRETARY OF THE ARMY—Wilber M. Brucker.

UNDER SECRETARY OF THE ARMY—Charles C. Finucane.

ASST. SECRETARY OF THE ARMY (Civil and Military Affairs)—Dewey Short.

Chief, Aviation Affairs—Colonel I. B. Washburn, Ext. 78789.

ASST. SECRETARY OF THE ARMY (Financial Management)—George Holmes Roderick.

ASST. SECRETARY OF THE ARMY (Logistics)—F. H. Higgins.

ASST. SECRETARY OF THE ARMY (Manpower, Personnel and Reserve Forces)—Hugh M. Milton, II.

DIRECTOR OF RESEARCH AND DEVELOPMENT—Dr. William H. Martin.

CHIEF OF STAFF—Gen. Maxwell D. Taylor.

DEPUTY CHIEF OF STAFF FOR LOGISTICS—Lt. Gen. C. B. Magruder.

Plans Division—Col. Jack L. Marinelli, Chief, Special Projects Branch, Ext. 72903 (monitors over-all logistics aspects of Army Aviation).

Requirements Division—Lt. Col. John R. Riddle, Major Equipment Section, Equipment Review Branch, Ext. 72833 (program manager for Army aircraft).

Procurement Division—Maj. Charles V. Graft, Jr., Aircraft and Missiles Unit, Programs and Budget Branch, Ext. 54333 (production analyst).

Storage and Distribution Division—Lt. Col. Carlyle W. Arey, chief, Aviation Section, Distribution Branch, Ext. 54634 (policies for and supervision of world-wide distribution of Army aircraft).

Material Maintenance Division—Maj. William P. Craddock, aircraft maintenance officer, Maintenance Engineering Branch, Ext. 77875 (supervises planning and implementation of aviation portion of Army maintenance program).

DEPUTY CHIEF OF STAFF FOR MILITARY OPERATIONS—Lt. Gen. C. D. Eddleman.

Army Aviation—Director, Brig. Gen. E. F. Easterbrook, Ext. 52882. Deputy Director, Col. H. D. Edson, Ext. 78764.

Aviation Safety Division—Col. J. F. Wells, Ext. 75207 (coordinates Army Aviation safety activity, aviation accident research, develops safety criteria for future Army aircraft).

Operations and Requirements Division—Col. W. G. Van Allen, Ext. 73228.

Programming and Analysis Division—Col. C. L. Shepard, Jr., Ext. 77528 (facilities, materiel, aircraft and organization).

DEPUTY CHIEF OF STAFF FOR PERSONNEL—Lt. Gen. D. P. Booth.

WELLS

VAN ALLEN

TRUDEAU

SHEPARD

BOOTH

BRITTON


BRISTOL


SPACEK

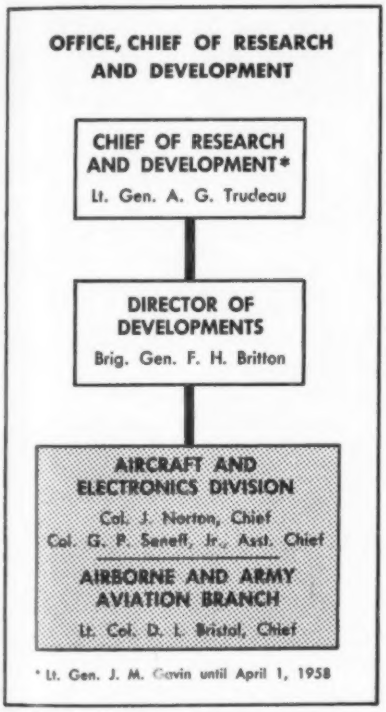

STORKE


CLIFTON


BEAMAN


BESSON

CHIEF OF RESEARCH AND DEVELOPMENT—Lt. Gen. J. M. Gavin (until April 1, 1958) Lt. Gen. Arthur G. Trudeau (after April 1).



Director of Developments—Brig. Gen. F. H. Britton, Ext. 75083 (directs R&D of all Army airport and aircraft equipment).

Aircraft and Electronics Division—Col. J. Norton, Ext. 53869.

Airborne and Army Aviation Branch—Lt. Col. D. L. Bristol, Ext. 53028 (airport equipment and aircraft).

Communications and Electronics Branch—Col. W. M. Van Harlingen, Ext. 77732 (Army communications and electronic equipment).

ASST. CHIEF OF STAFF, INTELLIGENCE—Maj. Gen. R. A. Schow.

Topographic and Geodetic Division—Col. E. G. Lawton.

Aerial Support—Maj. F. J. Spacek, Jr., Ext. 55639 (coordinates Army Aviation and aerial mapping on special projects).

Mapping—Maj. A. C. Northrop, Ext. 53649.

Plans and Programs—Lt. Col. K. L. Gress, Ext. 56059.

CHIEF OF INFORMATION—Maj. Gen. H. P. Storke.

Deputy Chief of Information—Brig. Gen. C. V. Clifton.

Special Projects Officer, Army Aviation—Lt. Col. H. E. Beaman, Ext. 78139 (Information Projects Officer for Army Aviation).

CHIEF OF TRANSPORTATION—Maj. Gen. Frank Besson.

Asst. Chief of Transportation, Military Operations—Brig. Gen. R. C. Tripp.

Training and Organization Division—Col. B. A. Lentz (in charge of military training and military organization).

Military Personnel Division—Col. R. S. Hahn.

Asst. Chief of Transportation, Materiel—Col. B. T. Resler.

Supply and Maintenance Division—Col. E. P. Ketcham, Jr., Ext. 71542 (handles aircraft, maritime, railway and general transport support administration vehicular equipment).

Procurement Division—Lt. Col. W. E. Schoenfeld, Ext. 52014 (procurement of all Transportation Corps items).

Facilities Division—Col. J. K. Troth.

Asst. Chief of Transportation, Army Aviation—Col. G. D. Cornell (acting), Ext. 78876.

Army Aviation Division—Col. L. Amoroso (acting), Ext. 77784 (operations, aviation systems, plans and programs).

Asst. Chief of Transportation, Research and Development—Col. W. N. Redling, Ext. 55480 (provides technical and staff supervision for Transportation Corps research and development program, includes Army aircraft).

Deputy—Lt. Col. Michael J. Strok, Ext. 73552.

Technical Director, Aviation—D. M. Thompson, Ext. 53445 (provides planning and technical supervision to Asst. Chief, R&D, TC).

CLASS II INSTALLATIONS (Field Commands):

U. S. Army Transportation Research and Engineering Command—Col. J. W. Koletty, Ft. Eustis, Va., Lee Hall 2511, Ext. 6276.


LENTZ


RESLER


SCHOENFELD


TROTH

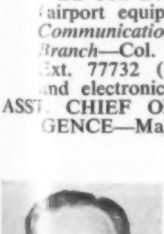
Aviation Division—L. M. Hewin, Lee Hall 2511, Ext. 6184.

U. S. Army Transportation Training Command—Maj. Gen. R. B. Lincoln, Ft. Eustis, Va., Lee Hall 2511, Ext. 5270.

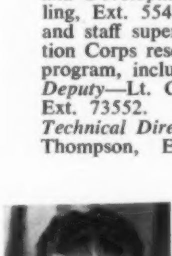
U. S. Army Transportation Corps, Army Aviation Field Office—Col. W. C. Hamill, Wright Patterson AFB, Dayton, Ohio, KEnmore 7111, Ext. 3-4111.

U. S. Army Transportation Supply and Maintenance Command—Brig. Gen. W. B. Bunker, 12th and Spruce Streets, St. Louis, Mo., MAin 1-6426.

U. S. Army Transportation Aviation Test and Support Activity—Lt. Col. C. F. Hollis, Ft. Rucker, Ala., Ft. Rucker 518, Ext. 2506.


CORNELL


AMOROSO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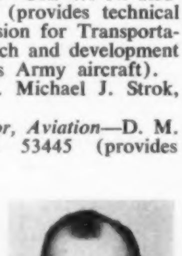
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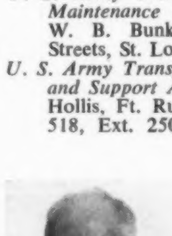
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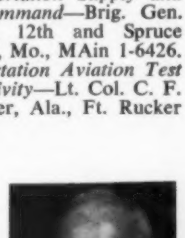

SCHOW


CLEVELAND


CUMMINGS


MCNAMARA


CHURCH


CALLOWAY


HEWITT


SHARPE


O'CONNELL


LEIDENHEIMER


HILL


STAMBAUGH


CREASY

CHIEF OF ENGINEERS—Maj. Gen. E. C. Itschner.

Asst. Chief of Engineers for Troop Operations—Brig. Gen. K. A. McCrimmon.

Organization and Training Division—Col. H. F. Cameron, Jr.

Army Aviation Branch—Maj. John G. Cleveland, Ext. 76269 (monitors and coordinates within office, Chief of Engineers, all matters pertaining to Army Aviation affecting the Corps of Engineers).

Research and Development Division—Col. H. E. Brown, Ext. 73855 (develops fire fighting equipment, night lighting sets for tactical airfields and heliports, portable hangars, camouflage materials, infrared devices, and fuel storage equipment).

Asst. Chief of Engineers for Military Construction—Brig. Gen. E. A. Brown, Jr.

Asst. for Army Construction—Col. T. E. Cuttino, Ext. 77969 (Army construction, including Army Aviation facilities).

Asst. for Engineering and Contracts—Col. Morton Solomon, Ext. 71937 (master plans for siting of airfield facilities, and design criteria and technical guidance for construction of airfield pavements and facilities).

Asst. Chief of Engineers for Real Estate—Col. J. U. Moorhead, Ext. 74224 (Dept. of the Army agent for procuring necessary land for airfields and heliports).

CHIEF OF ORDNANCE—Lt. Gen. E. L. Cummings.

Asst. Chief of Ordnance, Research and Development Division—Maj. Gen. August Schomburg.

Asst. Chief of Ordnance, Field Service Division—Maj. Gen. F. A. Hansen.

Asst. Chief of Ordnance, Industrial Division—Brig. Gen. F. J. McMorrow.

THE QUARTERMASTER GENERAL—Maj. Gen. A. T. McNamara.

Chief, Combat Development and Airborne Planning Branch—Col. C. R. Church, Ext. 56721 (concerned with planning program in aerial delivery field).

Chief, Research and Engineering Division—Col. J. D. Martz, Jr., Ext. 55607 (procures experimental items in research field).

Airborne Officer—Lt. Col. V. R. Chilson, Ext. 54757 (handles airborne research operations).

CLASS II INSTALLATIONS (Field Commands):

Quartermaster Research and Engineering Command—Brig. Gen. C. Calloway, Natick, Mass., OLympic 3-1000.

Staff Airborne Advisor—Lt. Col. H. H. Hewitt, OLympic 3-1000.

Chief, Aerial Delivery Office—L. W. Sharpe, OLympic 3-1000 (handles aerial delivery service).

CHIEF SIGNAL OFFICER—Maj. Gen. J. D. O'Connell.

Combat Development and Operations Division—Brig. Gen. S. S. Hoff, Ext. 53355 (staff adviser on aviation matters to the Chief Signal Officer).

Army Signal Aviation Coordinator—Col. J. L. Leidenheimer, Ext. 73858.

U. S. Signal Intelligence Agency

Army Aviation Flight Information Division—Capt. R. E. Hill, Ext. 67396 (handles flight information publications for Army Aviation. Authors instrument approach information. Monitors distribution of TM 11-2557 Series Airway Manual).

Procurement and Distribution Division—Maj. Gen. James Dreyfus, Ext. 67255.

Maintenance and Engineering Branch—Col. L. M. Reiser—Ext. 67177.

Avionics Installation and Maintenance Section—Lt. Col. H. E. Nestlerode, Ext. 63882. Also Aircraft Retrofit Coordinator.

Research and Development Division—Brig. Gen. R. J. Meyer, Ext. 79376.

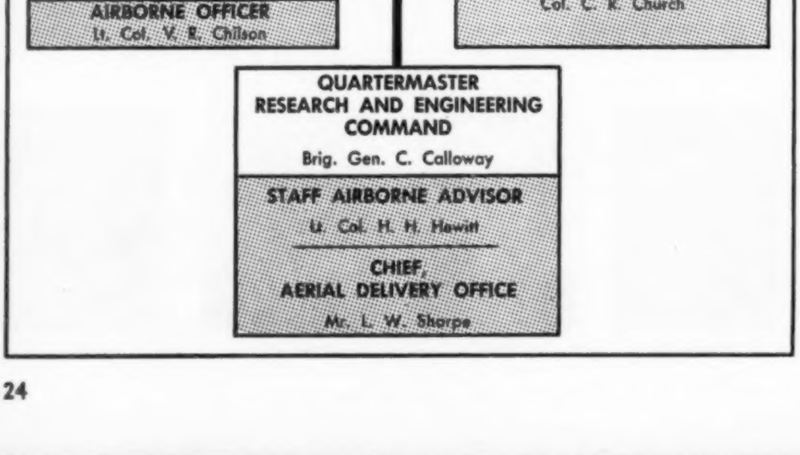
Communications Branch—Robert F. Brady, Ext. 73144.

Avionics and Surveillance Branch—W. A. Stambaugh, Ext. 73146 (air defense and countermeasures).

Electronics Branch—Lt. Col. H. T. Darracott, Ext. 73242.

CHIEF CHEMICAL OFFICER—Maj. Gen. W. M. Creasy.

Deputy Chief Chemical Officer for Scientific Activities—Dr. P. K. Frolich.



Logistics Planning Division—Col. G. P. Gibbons, Ext. 73821.

Chemical Corps Research and Development Command—Col. Graydon C. Essman.

THE SURGEON GENERAL—Maj. Gen. S. B. Hays.

Research and Development Division—Col. R. L. Hullinghorst.

Supply Division—Col. T. M. Carcow, Ext. 63115 (procures medical equipment and supplies for Army Aviation).

Medical Plans and Operations Division—Col. T. N. Page.

Assistant for Operations—Col. W. E. Neiman.

Aviation Branch—Lt. Col. Richard B. Austin III, Ext. 66274 (coordinates all Army Aviation medical activities).

U. S. CONTINENTAL ARMY COMMAND—Gen. Willard G. Wyman, Ft. Monroe, Va.

Army Aviation Section—Col. Charles R. Murray, HAmpton 7972, Ext. 21241 (all matters pertaining to aviation matters in CONARC).

Army Aviation and Airborne Division, Materiel Developments Section—Col. Robert F. Cassidy, HAmpton 7972, Ext. 21122 (handles all aspects of Army Aviation and airborne equipment in CONARC).

Combat Developments Section—Lt. Col. Albert L. Robinette, HAmpton 7972, Ext. 21176 (plans combat employment of Army Aviation).

AUSTIN

WYMAN

U. S. Army Aviation Board—Col. Robert R. Williams, Fort Rucker, Ala., OZark 818, Ext. 2404.

Army Aviation Center and School—Brig. Gen. B. S. Cairns, Fort Rucker, Ala., OZark 818, Ext. 2600.

Camp Gary (Primary Fixed-Wing Training)—Col. Jules E. Gonseth, San Marcos, Tex., EXport 2-2311, Ext. 3203.

Camp Wolters (Primary Helicopter Training)—Col. John L. Inskeep, Camp Wolters, Tex., FAirfax 5-2581.

MILITARY DISTRICT OF WASHINGTON: LIberty 5-6700.

Army Aviation Officer—Lt. Col. J. A. McCord, Jr., Ext. 57187.

Transportation Officer—Lt. Col. F. C. Allen, Ext. 75120.

Aviation Maintenance and Supply Officer—Capt. D. B. Wilson, Ext. 55374.

Davison U. S. Army Airfield, Ft. Belvoir, Va.—Col. John W. Britton, EDgewater 9-5500, Ext. 25101.

FIRST U. S. ARMY, FT. JAY, GOVERNORS ISLAND, N. Y.—Aviation Officer, Lt. Col. Gordon L. Kinley, WHitehall 4-7700, Ext. 8138.

SECOND U. S. ARMY, FT. MEADE, MD.—Aviation Officer, Lt. Col. Lyle H. Wright, ORchard 4-3311, Ext. 2089.

THIRD U. S. ARMY, FT. McPHERSON, GA.—Aviation Officer, Col. Kenuel K. Blacker, PLaza 3-3131, Ext. 5140.

FOURTH U. S. ARMY, FT. SAM HOUSTON, TEX.—Aviation Officer, Col. Arthur J. Anderson, CApitol 2-8411, Ext. 5231.

FIFTH U. S. ARMY, FT. SHERIDAN, ILL.—Aviation Officer, Lt. Col. Lewis N. Shaffer, BUtterfield 8-5800, Ext. 530.

SIXTH U. S. ARMY, PRESIDIO OF SAN FRANCISCO, CALIF.—Aviation Officer, Col. Frank G. Forrest, WEst 1-6111, Ext. 3270.

JOINT ORGANIZATIONS

Aeronautical Standards Group, Army Liaison Representative—L. A. Barr, Ext. 61251.

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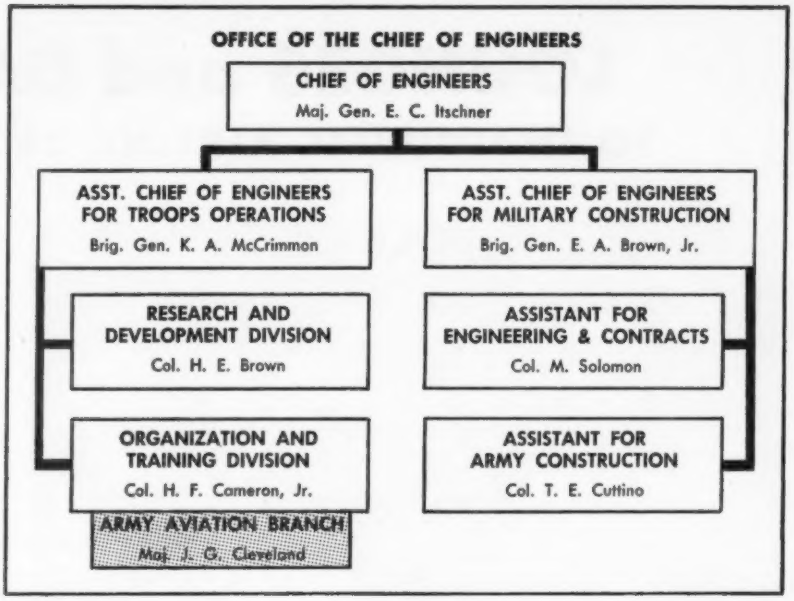
Aircraft Production Coordination Office, Army Member—Maj. C. V. Graft, Ext. 54333.



MURRAY

CASSIDY

GONSETH

INSKEEP

ROBINETTE

KINLEY

WRIGHT

BLACKER

ANDERSON

SHAFFER

FORREST

WASHBURN

Army Aviation today . . .

THE MISSION of Army Aviation has remained constant since the first aircraft were provided artillery units in 1942—to facilitate and speed the conduct of land operations.

Scope of the mission has increased since this first light aviation was sent into the field to do a single job, to serve as an aerial observation post for field artillery firing. Number and types of aircraft and of the men to fly and service them have increased in proportion. Primary mission of Army Aviation is to augment the capability of the Army to conduct effective combat operations on the ground. The corollary to that objective is that the man at the controls of Army aircraft must have a thorough basic understanding of the nature of ground warfare and of the tactics and techniques of ground arms.

At the peak period of World War II, the Army had some 2,000 L-4 Piper Cubs and as many aviators in combat, all attached in effect to field artillery units.

Army operates 4,800 aircraft

Today, in the three combat arms and four of the technical services there are approximately 4,800 fixed- and rotary-wing aircraft. Of these, 18% are used in the several training programs and 15% are issued to the reserve components. More than 4,000 commissioned and 900 warrant officers fly these aircraft. Approximately 9,000 enlisted men, primarily concerned with maintenance, support the program.

Job done by Army Aviation within the battlefield area, according to the immediate need of the ground commander, is in no sense revolutionary since those World War II days. Almost every aspect of the overall mission had its beginning in the work done by the tiny Cubs of the '40s.

Growth of Army Aviation has been evolutionary. It has consisted of the development and refinement of techniques rather than battlefield improvisation. The development and procurement of aircraft has been concentrated in providing air vehicles capable of fulfilling the many Army requirements.

One aircraft, the L-4 or its equivalent, served the Army of World War II. Thirteen types of aircraft are available to the Army commander of today. Two more are nearing completion for the system.

Army's present inventory of aircraft is designed to give the Army internal mobility and to provide tools to enhance the Army's ground combat capability.

Observation—This traditional role of Army Aviation is being performed today by the fixed-wing Bird Dog (Cessna L-19) and by two helicopters, the Sioux (Bell H-13) and the Raven (Hiller H-23). This includes locating and adjusting fire for artillery, mortars and missiles; terrain study, including road, river and bridge reconnaissance; limited aerial photography, and providing commanders with a "bird's-eye view" of their own and enemy troops within the battlefield area.

Rapid troop movement—Air movement of Army combat units and their equipment in the combat zone for combat and logistical operations is accomplished with the Shawnee (Vertol H-21) and the Choctaw (Sikorsky H-34) helicopters, and the Otter (de Havilland U-1) airplane. These troop movements enable the commander to cross natural obstacles such as swamps, rivers and woods and to cross or by-pass enemy obstacles such as mines, radiation barriers, tree blow-downs or others. They also provide superior mobility to exploit the shock effect of atomic firepower.

Commenting on the mobility differential achieved by the use of Army Aviation Maj. Gen. Hamilton H. Howze, former Director of Army Aviation, says:

". . . Helicopter-borne infantry forces can originate much further to the rear than can less mobile elements. This mobility gives to helicopter infantry much greater latitude in the selection of points of thrust against the enemy, enhances greatly the possibility of surprise, and makes helicopter infantry an excellent force to collaborate with tank forces in attack or counterattack . . ."

Rapid movement of critical supplies—The same three aircraft used for troop movement are used for supply transport. Aircraft are employed in the same manner as land transport and under the same system of priorities.

Augmentation of land reconnaissance capability—Army Aviation is used to provide greater mobility and flexibility to reconnaissance forces. Airborne, these units provide the Army with a capability in the true cavalry tradition—to increase the commander's capability for reconnaissance, counter-reconnaissance, screening, flank security, seizure of critical areas in advance of heavier forces, pursuit and exploitation. Their operations use a combination of both fixed-wing airplanes and helicopters.

Command, liaison and communications—Command, liaison and communications functions of Army Aviation have increased in urgency because of the wide dispersal of units necessary to survival on an atomic battlefield. For this, the Army uses the Beaver (de Havilland L-20), a rugged aircraft carrying six persons or 1,000 pounds of equipment; the Seminole (Beechcraft L-23), six-place with the added feature of two engines (and approxi-

(Continued on page 31)

Mohawk spells high-performance observation for Army

AN ALL-ARMY PROJECT since Navy withdrew funding for Marines, Grumman's AO-1 Mohawk is scheduled for first flight in spring, 1959. Powered by two 1,005-horsepower Lycoming T53-L-3 turboprop engines swinging Hamilton Standard propellers, STOL observation plane symbolizes high performance and versatility being built into Army's new aircraft. Maximum speed is 275 kts. at 5,000 ft. and stall speed is only 55 kts. Takeoff over a 50-ft. obstacle may be accomplished from a 600-ft. strip at a gross weight of 10,400 lbs. Rate of climb is 3,000 fpm and service ceiling is over 25,000 ft. High lift and low speed stability are attributed to hydraulically actuated wing leading edge slats and slotted flaps. Mohawk may be equipped with skis for operation from mud, snow or water. Skis would retract with conventional tricycle gear. Racks under each wing permit carrying external stores up to 3,000 lbs. total weight. Bubble canopy affords exceptional visibility for pilot and observer seated side-by-side in Martin-Baker low-altitude ejection seats. To achieve low weight and manufacturing simplicity, non-structural doors and panels are magnesium and chem-milling has been used extensively. Virtual elimination of formed skins permits light alloy sheet metal to be wrapped on from stock except in cockpit area.

Inventory of Army aircraft today

Aero Design L-26C

Gross wt.—7,000 lbs.; **empty wt.**—4,330 lbs. **Dimensions:** L-35.4 ft., W-44.0 ft., H-14.8 ft. **Normal fuel capacity**—230 gals., 1,380 lbs. **Engine**—Model GSO-480, Mfr.—Lycoming; No. used—2; normal hp—320 each, T/O hp—340 each. **Service ceiling**—24,300 ft. **Crew**—2. **Cruise speed**—165 knots. **Max. range**—1,215 n.m. **Max. range payload**—845 lbs. **Cargo/passenger capacity**—1,174 lbs. plus 4 passengers (100 n.m. combat radius); 45 lbs. plus 4 passengers (max. range). **Primary mission**—command. **Typical missions**—command aerial inspection of ground force areas, installations and march columns; limited cargo resupply.

Beech L-23D Seminole

Gross wt.—7,000 lbs.; **empty wt.**—4,841 lbs. **Dimensions:** L-31.5 ft., W-45.3 ft., H-11.3 ft. **Normal fuel capacity**—230 gals., 1,380 lbs. **Engine**—Model O-480-1, Mfr.—Lycoming; No. used—2, normal hp—320 each, T/O hp 340 each. **Service ceiling**—26,300 ft. **Crew**—1. **Cruise speed**—169 knots. **Max. range**—1,041 n.m. **Max. range payload**—334 lbs. **Cargo/passenger capacity**—621 lbs. plus 5 passengers (100 n.m. combat radius); 134 lbs. plus 2 passengers (max. range). **Primary mission**—command. **Typical missions**—command aerial inspection of ground force areas, installations, and march columns; limited cargo resupply.

Cessna L-19A Bird Dog

Gross wt.—2,165 lbs.; **empty wt.**—1,613 lbs. **Dimensions:** L-25.0 ft., W-36.0 ft., H-8.3 ft. **Normal fuel capacity**—42 gals., 252 lbs. **Engine**—Model O-470-11. Mfr.—Continental; No. used—1; normal hp—190, T/O hp—213. **Service ceiling**—20,000 ft. **Crew**—1. **Cruise speed**—78 knots. **Max. range**—585 n.m. **Max. range payload**—81 lbs. **Cargo/passenger capacity**—65 lbs. plus 1 passenger (100 n.m.). **Primary mission**—observation. **Typical missions**—adjustment of artillery and mortar fire; battlefield surveillance; combat zone reconnaissance; limited aerial resupply; **flight training**.

DeHavilland U-1A Otter

Gross wt.—8,000 lbs.; **empty wt.**—4,716 lbs. **Dimensions:** L-41.8 ft., W-58.0 ft., H-12.8 ft. **Normal fuel capacity**—213 gals., 1,278 lbs. **Engine**—Model R-1340-59, Mfr.—P & W; No. used—1; normal hp—500, T/O hp—600. **Service ceiling**—18,500 ft. **Crew**—2. **Cruise speed**—107 knots. **Max. range**—860 n.m. **Max. range payload**—1,525 lbs. **Cargo/passenger capacity**—709 lbs. plus 9 passengers (100 n.m. combat radius); 121 lbs. plus 7 passengers (max. range). **Primary mission**—light cargo. **Typical missions**—combat zone resupply; transportation of troops within combat zone; emergency aero-medical evacuation.

DeHavilland L-20A Beaver

Gross wt.—4,820 lbs.; **Empty wt.**—3,272 lbs. **Dimensions:** L-30.4 ft., W-48.0 ft., H-9.0 ft. **Normal fuel capacity**—95 gals., 570 lbs. **Engine**—Model R-985-AN-1, Mfr.—P & W; No. used—1; normal hp—400, T/O hp—450. **Service ceiling**—20,100 ft. **Crew**—1. **Cruise speed**—118 knots. **Max. range**—600 n.m. **Max. range payload**—730 lbs. **Cargo/passenger capacity**—309 lbs. plus 5 passengers (100 n.m. combat radius); 130 lbs. plus 4 passengers (max. range). **Primary mission**—utility. **Typical missions**—limited aerial troop transportation; limited aerial supply; emergency aerial evacuation.

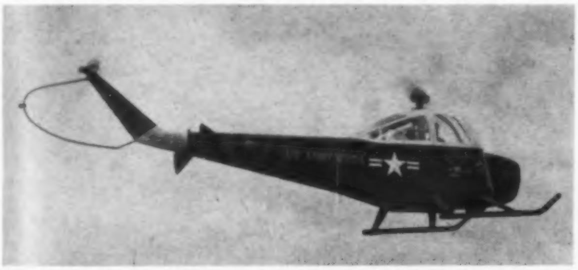
Bell H-40 Iroquois

Gross wt.—5,400 lbs.; **empty wt.**—3,464 lbs. **Dimensions:** L-40.3 ft., W-10.2 ft., H-14.6 ft. (blades off). **Normal fuel capacity**—125 gals., 750 lbs. **Engine**—Model XT-53-L-1, Mfr.—Lycoming; No. used—1; normal hp—770, T/O hp—825. **Service ceiling**—21,600 ft. **Crew**—1. **Cruise speed**—100 knots. **Max. range**—200 n.m. **Max. range payload**—911 lbs. **Cargo/passenger capacity**—111 lbs. plus 4 passengers or 3 litters. **Primary mission**—utility. **Typical missions**—troop personnel, special teams or crews and equipment and supplies; medical evacution.

Bell H-13 Sioux

Gross wt.—2,350 lbs.; **empty wt.**—1,718 lbs. **Dimensions:** L-27.3 ft., W-8.3 ft., H-9.5 ft. (blades off). **Normal fuel capacity**—43 gals., 258 lbs. **Engine**—Model O-435-23, Mfr.—Lycoming; No. used—1; normal hp—200, T/O hp—200. **Service ceiling**—14,900 ft. **Crew**—1. **Cruise speed**—61 knots. **Max. range**—182 n.m. **Max. range payload**—159 lbs. **Cargo/passenger capacity**—2 external litters (special condition). **Primary mission**—reconnaissance. **Typical missions**—combat recon.; courier and liaison operations; front-line observation and fire control for artillery and mortar; emergency medical evacuation; emergency resupply; training.

Cessna H-41 Seneca

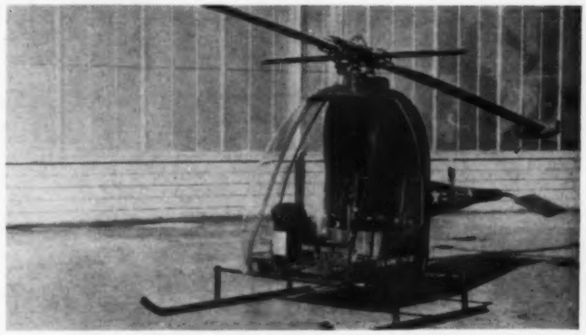


Gross wt.—3,000 lbs.; **empty wt.**—1,975 lbs. **Dimensions:** L-27.3 ft., W-5.33 ft., H-8.6 ft. (blades off). **Normal fuel capacity**—60 gals., 360 lbs. **Engine**—Model O-470-A, Mfr.—Continental; No. used—1; normal hp—260, T/O hp—270. **Service ceiling**—8,600 ft. **Crew**—1. **Cruise speed**—112 knots. **Max. range**—252 n.m. **Max. range payload**—618 lbs. **Cargo/passenger capacity**—235 lbs. plus 3 passengers (100 n.m. combat radius); 18 lbs. plus 3 passengers (max. range). **Primary mission**—command/utility. **Typical missions**—troop personnel; special teams or crews and equipment and supplies; medical evacuation.

Hiller H-23D Raven

Gross wt.—2,369 lbs.; **empty wt.**—1,767 lbs. **Dimensions:** L-26.8 ft., W-10.0 ft., H-9.8 ft. (blades off). **Normal fuel capacity**—48 gals., 258 lbs. **Engine**—Model O-435-23-A, Mfr.—Lycoming; No. used—1; normal hp—250, T/O hp—250. **Service ceiling**—11,[illegible]00 ft. **Crew**—1. **Cruise speed**—60 knots. **Max. range**—175 n.m. **Max. range payload**—95 lbs. **Cargo/passenger capacity**—2 external litters (special condition) or 2 passengers. **Primary mission**—reconnaissance. **Typical missions**—combat recon.; courier and liaison operations; front line observation and fire control (artillery and mortar); emergency medical evacuation; emergency resupply; training.

Hiller YH-32



Gross wt.—1,080 lbs.; **empty wt.**—575 lbs. **Dimensions:** L-13.4 ft., W-7.5 ft., H-7.8 ft. (blades off). **Normal fuel capacity**—50 gals., 330 lbs. **Engine**—Model 8RJ2B, Mfr.—Hiller; No. used—2; normal hp—40 lbs., s.t.; T/O hp—40 lbs. s.t. **Service ceiling**—6,000 ft. **Cruise speed**—61 knots. **Crew**—1. **Combat radius**—12 n.m. **Max. range payload**—none. **Max. range**—24 n.m. **Cargo/passenger capacity**—1 passenger. **Primary mission**—reconnaissance. **Typical missions**—combat reconnaissance; courier and liaison operations; front line observation and fire control (artillery and mortar); emergency medical evacuation; emergency resupply; training.

Sikorsky H-19D Chickasaw

Gross wt.—7,522 lbs.; **empty wt.**—5,651 lbs. **Dimensions:** L-41.5 ft., W-11.0 ft., H-15.3 ft. (blades folded). **Normal fuel capacity**—175 gals., 1,050 lbs. **Engine**—Model R-1300-3, Mfr.—Wright; No. used—1; normal hp—700, T/O hp—700. **Service ceiling**—11,800 ft. **Crew**—1. **Cruise speed**—81 knots. **Max. range**—327 n.m. **Max. range payload**—555 lbs. **Cargo/passenger capacity**—165 lbs. plus 5 passengers or 5 litters (100 n.m. combat radius); 155 lbs. plus 3 passengers or 2 litters (max. range). **Primary mission**—utility. **Typical missions**—to be used by aero-medical evacuation companies; presently used as interim light cargo helicopters in transportation companies; troop transportation. Used as transition trainer for single rotor.

Sikorsky H-34A Choctaw

Gross wt.—12,020 lbs.; **empty wt.**—7,684 lbs. **Dimensions:** L-44.2 ft., W-12.0 ft., H-15.8 ft. (blades folded). **Normal fuel capacity**—263 gals., 1,578 lbs. **Engine**—Model R-1820-84, Mfr. Wright; No. used—1; normal hp—1,275, T/O hp—1,525. **Service ceiling**—8,900 ft. **Crew**—2. **Cruise speed**—90 knots. **Max. range**—233 n.m. **Max. range payload**—2,290 lbs. **Cargo/passenger capacity**—112 lbs. plus 12 passengers or 8 litters (100 n.m. combat radius); 90 lbs. plus 11 passengers or 8 litters (max. range). **Primary mission**—light transport. **Typical missions**—combat zone resupply; transportation of troops within combat zone; emergency aero-medical evacuation.

(Continued from page 27)

mately 60% more speed than the Beaver); the Bird Dog airplane, and the Sioux and Raven helicopters.

Signal Corps units use these aircraft for wire-laying and to reconnoiter the axis of signal communication, radio relay sites and wire routes. They are also used as radio relay stations between march elements or between column and higher headquarters, for messenger service, for air courier to transport bulky or classified material, and for message drop and pickup to supplement other means of communication.

Battlefield casualty evacuation—This is one of the best known and certainly the most widely understood function of Army Aviation. The experience of the Korean War, when some 15,000 wounded were carried by Sioux and Raven helicopters to initial points of treatment and subsequently to hospital facilities within the Army Combat Zone, proved the life-saving efficiency of this method of evacuation.

Helicopter evacuation under medical control contributed to the reduction of mortality among wounded to the phenomenal figure of only 2.4%. Manned by Medical Service Corps officers, duly qualified as both pilots and medical assistants, the Sioux and the Raven are still used for this purpose. Two litter-pods are attached to their frames.

In addition, Army medical detachments and companies now attached to field armies use the Chickasaw (Sikorsky H-19). The Chickasaw is one of the Army's utility helicopters which can accommodate a number of casualties at one time.

How Army Aviation is organized

The organization and integration of Army Aviation into the Army combat and logistical structure reflects the manner in which the Army uses aviation.

Aviation is organized into companies and battalions located at various command echelons within the field army. These units are organized and equipped so that elements can be detached and still function effectively.

Divisions and corps have a combat aviation company to support their operations. These aviation companies have an assortment of airplanes and helicopters necessary to perform the wide variety of tasks required of combat and support units which do not have organic aviation.

Each infantry, armor and airborne division has an organic aviation company of about 50 aircraft of various types essential to the assigned mission. All division aviation companies follow the same organizational pattern with four subdivisions to the company. They are, first, a group of command and control elements; second, a direct support element; third, a general support group, and, finally, a service platoon. Mission of the command and

Army aircraft inventory *(continued)*

Sikorsky H-37A Mojave

Gross wt.—29,157 lbs.; **empty wt.**—19,985 lbs. **Dimensions:** L-64.2 ft., W-27.4 ft., H-22.0 ft. (blades folded). **Normal fuel capacity**—400 gals., 2,400 lbs. **Engine**—Model R-2800-54, Mfr. —P & W; No. used—2; normal hp—1,900, T/O hp—2,100. **Service ceiling**—9,400 ft. **Crew**—3. **Cruise speed**—95 knots. **Max. range**—120 n.m. **Max. range payload**—6,000 lbs. **Cargo passenger capacity**—22 passengers or 21 litters (100 n.m. combat radius); 1,400 lbs. plus 23 passengers or 22 litters (max. range). **Primary mission**—medium transport. **Typical missions**—combat zone resupply; transportation of troops within combat zone; emergency aero-medical evacuation.

Vertol H-21C Shawnee

Gross wt.—13,500 lbs.; **empty wt.**—9,090 lbs. **Dimensions:** L-52.6 ft., W-13.3 ft., H-16.7 ft. (blades folded). **Normal fuel capacity**—300 gals., 1,800 lbs. **Engine**—Model R-1820-103, Mfr.—Wright; No. used—1; normal hp—1,275, T/O hp—1,425. **Service ceiling**—8,900 ft. **Crew**—2. **Cruise speed**—85 knots. **Max. range**—300 n.m. **Max. range payload**—2,064 lbs. **Cargo/passenger capacity**—64 lbs. plus 13 passengers or 12 litters (100 n.m. combat radius); 64 lbs. plus 10 passengers or 9 litters (max. range). **Primary mission**—light transport. **Typical missions**—combat zone resupply; transportation of troops within combat zone; emergency aero-medical evacuation.

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control element is to supervise aviation operations.

The direct support element, operating from one or more forward strips, provides aviation for the battle groups and the artillery. It also provides the electronic and photographic surveillance elements. This furnishes combat elements of the division with the aviation support they need on a continuing, day-to-day basis.

The general support platoon operates from a base field, supports for other elements of the division and reinforces the direct support platoon as the need arises. The service platoon performs organizational maintenance and airfield service for the company.

Similarly, each corps has two combat aviation companies. One is to support the corps headquarters and corps troops and the other to support corps artillery operations.

The bulk of Army Aviation is under the direct control of the field army commander. This insures flexibility and permits the commander to use aviation to reinforce and support in greater strength the efforts of corps and divisions whose operations he considers particularly important.

Transport units, too

In addition to a combat aviation company to support his headquarters and troops the Army commander has transport aviation units.

The transport aviation battalion is a flexible organization whose composition can be tailored to fit the tactical requirements. It contains three light cargo helicopter companies, one medium cargo helicopter company and one fixed-wing transport company.

The field Army commander can keep these units directly under his command or place them in support of subordinate echelons, according to need. Their primary role is in support of tactical operations. They transport combat units and their weapons and move critically needed supplies. Their secondary role is that of logistical support.

Extensive R&D program

Army Aviation gives freedom of movement to the forward elements of ground combat forces. An extensive research and development program together with a crowded experiment and test schedule promises that the Army's organic aviation will contribute vastly increased mobility to the field army of the future.

Present and future value of organic aircraft to the Army is perhaps best illustrated through certain peacetime uses of this aircraft. Both show how U.S. Army Aviation can move alongside the soldier, regardless of terrain. It is immediately available to the commander and responsive to his need.

The U.S. Army's Corps of Engineers in time of war would use Army Aviation for purposes such as tactical bridging, removal of such enemy barriers as tree blow-downs, detonating mine fields, service as flying cranes and tow-ferries, and placement of anchor cables across rivers. The Engineers are developing these techniques now.

The Corps of Engineers is charged with the responsibility of making the Army's maps. A few years ago, prior to the acquisition by the corps of organic aircraft, engineer survey teams struggled up icy mountains in Alaska and through the dense tropical growth of South American jungles to reach their control points. Today, these same engineer units, operating in some of the most primitive areas on earth, are delivered to desired sites by Army aircraft, both helicopter and fixed-wing. The units are serviced and supplied by the same means.

The first large survey project utilizing Army Aviation was accomplished by the 30th Engineer Group (Topographic Survey). During six consecutive short summer seasons, this group surveyed over 313,000 sq. mi. of western and northern Alaska, Aleutians to the Arctic Ocean.

Completely devoid of roads, the area's glacier-covered mountains and muskeg bogs made surface travel virtually impossible. Without its aircraft—and to expedite the mission, the Army's first Otters were included in 1955—the group simply could not have accomplished this mapping mission without years of additional work.

The Inter-American Geodetic Survey, with headquarters in Panama, is presently engaged in a similar survey of Central and South America. The company has Army airplanes and helicopters in continuous operation in 17 different countries from Mexico to Brazil. Similar surveys are under way in the Libyan desert, in Iran and in Bangkok, Thailand.

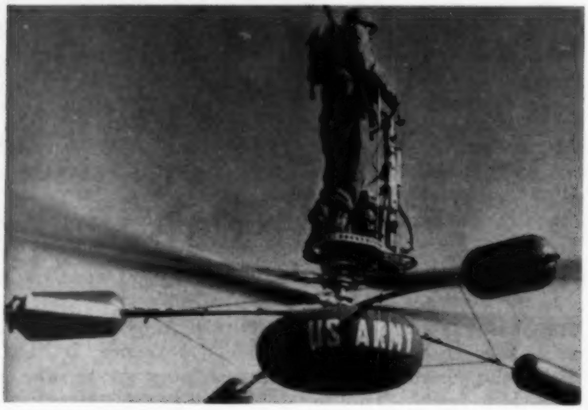
In all cases, where Army Aviation is used, the work is being speeded by that extra touch of "mobility." Army aircraft gets the engineer on site where he wants to be, regardless of terrain. Sometimes the small Raven must be the first in, carrying a man and the tools necessary to hack out from the jungle or mountain range a landing spot large enough for an Otter to come in with the surveying party and their supplies. Larger aircraft can sometimes go in on the first try.

However the task is accomplished, the men get in. They are supplied and resupplied. Their messages to each other are always transmitted, whatever failure of radio equipment; medical evacuation is immediately available. They are picked up when their mapping mission—as important to war as guns and men—is completed.

This is organic Army aircraft at work. Army Aviation makes it possible for a commander to fight today's type battles. He will need Army Aviation to fight the battles of the future.

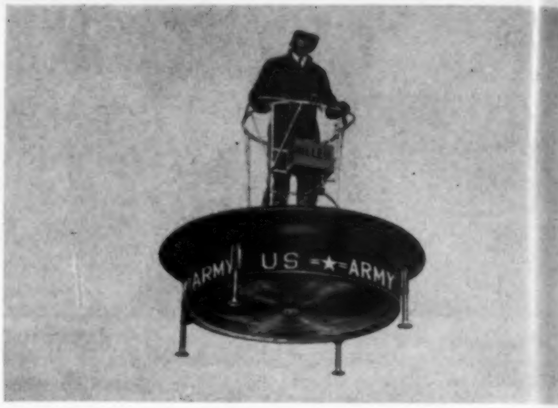
Circle No. 116 on Reader Service Card. ⟶

Army Research & Development "Flying Platforms"



DeLackner Aerocycle

Gross wt.—470 lbs.; **empty wt.**—250 lbs. **Dimensions:** L-11.0 ft., W-10.4 ft., H-6.6 ft. (blades off). **Normal fuel capacity**—3.3 gals., 19.8 lbs. **Engine**—Model Merc Mark 55, Mfr.—Keickhaefer; No. used—1; normal hp—43, T/O hp—40. **Service ceiling, cruise speed**—unknown. **Crew**—1. **Combat radius**—unknown. **Max. range payload**—none. **Max. range**—unknown. **Cargo/passenger capacity**—none. **Primary mission**—observation. **Status**—experimental. **Manufacturer**—DeLackner Helicopters, Inc., 14 N. Bleeker St., Mt. Vernon, N.Y.



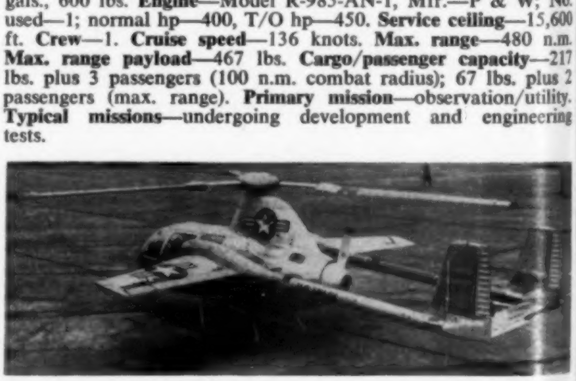
Hiller Rotorcycle Pawnee

Gross wt.—764 lbs.; **empty wt.**—465 lbs. **Dimensions:** L-8.6 ft., W-8.64 ft., H-6.16 ft. **Normal fuel capacity**—9.7 gals., 58.2 lbs. **Engine**—Model H-59, Mfr.—Nelson; No. used—3; normal hp—49, T/O hp—49. **Service ceiling**—3,500 ft. **Cruise speed**—30 knots. **Crew**—1. **Combat radius**—15 n.m. **Max. range payload**—40 lbs. **Cargo/passenger capacity**—none. **Primary Army mission**—observation. **Status**—experimental.

Army Research & Development VTOL Aircraft

Bell XV-3

Gross wt.—4,744 lbs.; **empty wt.**—3,412 lbs. **Dimensions:** L-30.33 ft., W-31.33 ft., H-13.63 ft. **Normal fuel capacity**—100 gals., 600 lbs. **Engine**—Model R-985-AN-1, Mfr.—P & W; No. used—1; normal hp—400, T/O hp—450. **Service ceiling**—15,600 ft. **Crew**—1. **Cruise speed**—136 knots. **Max. range**—480 n.m. **Max. range payload**—467 lbs. **Cargo/passenger capacity**—217 lbs. plus 3 passengers (100 n.m. combat radius); 67 lbs. plus 2 passengers (max. range). **Primary mission**—observation/utility. **Typical missions**—undergoing development and engineering tests.



McDonnell XV-1

Gross wt.—4,800 lbs.; **empty wt.**—3,651 lbs. **Dimensions:** L-30.5 ft., W-26.0 ft., H-10.1 ft. (blades off). **Normal fuel capacity**—83.3 gals., 499.8 lbs. **Engine**—Model R-975-42, Mfr.—Continental; No. used—1; normal hp—525, T/O hp—550. **Service ceiling**—11,800 ft. **Crew**—1. **Cruise speed**—120 knots. **Max. range**—318 n.m. **Max. range payload**—410 lbs. **Cargo/passenger capacity**—395 lbs. plus 1 passenger (100 n.m. combat radius); 210 lbs. plus 1 passenger (max. range). **Primary mission**—observation. **Typical missions**—"State of the Art" development. No plans to acquire more.

Mobility, 1970 style

Plans call for fewer but better aircraft

MOBILITY, firepower, communications—these are the keys to success in battle today and tomorrow, just as they have been from the beginning of organized warfare when Babylonian infantrymen first learned to march and fight in formation.

Mobility enables the commander to maneuver—to concentrate firepower to exploit favorable opportunities, or to disperse to minimize the effect of enemy firepower.

On the atomic battlefield, mobility becomes even more important. Atomic weapons, which multiply firepower yet tend to equalize it for opposing forces, make speed truly the secret of success.

Through World War II and the Korean conflict, the Army gained most of its mobility from wheels and tracks. But these lost much of their effectiveness against terrain features such as rivers and dry gaps. They lose even more effectiveness over a battle area measured in many thousands of square miles. To gain the speed and fluidity it must have, the Army must now take to the air to gain three-dimensional mobility.

This necessity is distinctly an opportunity and a challenge, rather than a disadvantage; for Army Aviation will provide the Army of 1970 and beyond with mobility, flexibility and battle efficiency greater than ever known.

It is the mission of Army Research and Development to develop the family of aircraft to do this job. The 1970 aircraft must be able to accomplish a wide variety of missions under varying situations. The task breaks down into six functions: (1) observation; (2) rapid troop airlift in the combat zone; (3) rapid supply airlift in the combat zone; (4) air mobility for reconnaissance; (5) command, liaison and communication; and (6) casualty evacuation.

The 1970 aircraft must also meet the following requirements: (1) low maintenance; (2) ability to operate from unimproved terrain; (3) vertical or short takeoff and landing capability; and (4) all-weather capability.

Here's how the Army proposes to move from where it stands today in Army Aviation to where it intends to be in 1970:

Generally, it will go through this process of change by evolution rather than revolution. It will not sacrifice ability to perform assigned missions during the interim period.

Specifically, it will reduce the family of aircraft to five models from the 10 models in the Army inventory today. (Chart illustrates a logical development program.) These five 1970 aircraft will perform much the same missions as those assigned to the 10 models today—only better. The reduction in numbers will also reduce training, maintenance and logistical support.

The Army will make the following specific interim transitions and 1970 advances:

1970 aerial jeep—Like its wheeled predecessor, the aerial jeep will be an ideal liaison vehicle to forward units. It will fly either a few feet above the ground, or reach altitudes necessary to adjust short-range artillery and other weapons. It will assume part of the functions now filled by the L-19 Bird Dog liaison plane.

Super Bird Dog (interim aircraft)—With the development of a satisfactory light gas turbine engine, it will be possible to build an aircraft similar to the Bird Dog, but with greatly improved performance characteristics.

Mohawk (interim aircraft)—Within the next few years, the Army will integrate into Army Aviation its first higher-performance (300 mph) airplane, the Mohawk. It is specifically designed for observation, reconnaissance and target acquisition by use of electronic aids. It, too, will assume part of the present Bird Dog responsibility. It will also be more satisfactory for command liaison.

1970 Mohawk successor—This air-

ARMY AIRCRAFT 1958 to 1970

craft probably will be jet-propelled and capable of speeds up to Mach 1, while still retaining short takeoff landing or even vertical takeoff landing characteristics. A flying electronic surveillance and target acquisition platform, it will be able to seek out targets at the extreme ranges of all weapons assigned to the field army.

Iroquois H-40 (interim helicopter)—The first gas-turbine powered helicopter designed in America. Built to fill a utility role, it will replace the H-19 Chickasaw. It will also perform some of the missions now assigned to the H-21 Shawnee and H-34 Choctaw. A transporter version of the Iroquois, through improved configuration, will provide the Army with an aerial personnel carrier capable of moving an Infantry squad in one lift.

Chinook (interim helicopter)—A replacement for the H-37 Mojave, the Chinook will be developed during the next five years. Far more versatile than the present medium transport helicopter, the Chinook will be smaller and simpler to operate. With three-ton payload, it will be an excellent vehicle to move personnel and supplies in both rear and forward areas.

Two-place helicopter (interim)—This should be a logical replacement for the H-23 Raven and H-13 Sioux, the present observation and reconnaissance helicopters. The Sioux and Raven are too expensive in original cost and in maintenance to permit the Army to buy them in the quantity needed by combat elements. The new two-place helicopter should cost no more than a third of the cost of today's standard reconnaissance helicopter.

Caribou DHC-4 (interim aircraft)—For fixed-wing missions in the utility and transport class, the Caribou will be capable of carrying from two to four tons on a 250-mile radius-of-action mission. To be in the hands of troops about 1960, this airplane is designed to operate from rough terrain with short takeoff and landing characteristics.

1970 transports—Today the Army uses more than half-a-dozen different helicopters and airplanes for logistics vehicles. In the Futurarmy it will have only two: (1) A light transport capable of carrying loads of about 2½ tons; and (2) a vehicle in the 4-ton class.

1970 flying crane—To provide a heavy lift capability, a flying crane will be developed. This will be a very simple machine, but with a load capacity of 12 tons.

To achieve these interim models and 1970 standardized models, the Army is thoroughly exploring and exploiting every advance possible through newer engines, newer navigation devices and radical approaches in aerodynamics. It is building flying test-beds to determine the suitability of ducted fans, tilting rotors, tilting wings, multi-wings and deflected or vectored slipstreams to see which will be the most suitable for 1970 aircraft.

More $$ for aviation despite drop in Army funds

ARMY'S EXPANDING EMPHASIS on aviation and aerial delivery equipment is evidenced by substantial increases during recent years in expenditures for Army Aviation.

Emphasis on speed of movement of troops and their equipment within the battle zone requires that the Army put greater effort into the means whereby this speed can best be accomplished.

The necessity for transporting vehicles, construction equipment, mapping and photographic equipment, and combat and support materiel, sometimes over considerable distances in the minimum of time, dictates the desirability and, in some cases, the indispensability of aerial delivery.

In such activities as terrain mapping and aerial photography, air transport is essential. In some kinds of terrain, aerial movement is the only possible method for getting supplies and equipment to the point where they are required at the time they are required.

The design, testing and purchase of such equipment is an expensive business. The articles needed are not found on the shelves, already made by commercial firms. Often special equipment has to be developed, and for only one customer, the Army. Costs are naturally high.

One of the best yardsticks by which the Army's increasing emphasis on aviation is measured is the amount of money expended for procurement and production of aircraft. Net expenditure figures for procurement and production for fiscal years 1952-1957 inclusive (see Table 1) reveal this increasing emphasis. These figures represent Defense Dept. budget category data and exclude figures for industrial mobilization.

From this data it is evident that for each year in which the total P&P expenditures increased, the expenditures for Army Aviation also increased, and at an accelerated rate. For example, in 1953 the total Army P&P net expenditures increased by 46% over 1952, but the net expenditures for the Army Aviation portion increased 87%.

Fiscal year	% of total P&P net expenditures for Army aircraft
1952	1.3
1953	1.6
1954	2.4
1955	5.6
1956	10.0
1957	10.8

TABLE 2—Percent of total Army P&P net expenditures for procurement and production of Army aircraft (Fiscal years 1952 through 1957).

Fiscal year 1956 shows a 12% increase over 1955 in the total P&P net expenditures, compared with an increase of 101% in the Army Aviation portion.

Likewise, whenever the total Army P&P net expenditures decline in comparison with the preceding year, the net expenditures for Army Aviation P&P also decline, but at a lesser rate. For example, the total P&P net expenditures were reduced by 40% in 1954 when compared with 1953, but Army Aviation expenditures declined only 13%.

For 1955 the comparison is 65% reduction in total P&P net expenditures contrasted with only 19% for the Army Aviation portion of the total.

The portion of total P&P net expenditure devoted to Army aircraft procurement during each fiscal year from 1952 through 1957 shows a constant increase over the preceding year.

In fiscal '52 (see Table 2) the net expenditures from P&P appropriation for aviation were 1.3% of the net expenditure for all Army procurement and production. Five years later (fiscal 1957) the proportion for aviation had risen to 10.8%—more than eight times as much percentage-wise as was expended in fiscal '52.

For all production and procurement, the Army reduced its net expenditures from $3.976 billion in 1952 to about $1.534 billion in 1957—less than 40% of the amount expended in 1952. The actual dollar expenditure for aircraft procurement, however, during the same six fiscal years increased to about $51 million (Table 1, Col. 4) to more than $165 million—more than 3 times as much as was spent in 1952.

Fiscal year	Net expenditure, total P&P* (millions)	% change over preceding year	Net expenditure for aircraft	% change over preceding year
1952	$ 3,976.1	....	$ 50.1	....
1953	5,793.8	+46	95.3	+87
1954	3,447.9	–40	82.5	–13
1955	1,196.0	–65	66.5	–19
1956	1,338.9	+12	133.9	+101
1957	1,533.6	+15	165.7	+24
Totals	$17,286.3	....	$594.8	....

TABLE 1—Net expenditures from procurement and production appropriations, fiscal 1952 through fiscal 1957 (in millions).
*P&P Procurement and production.

Also significant is the fact that in no single year of the six was there a decline in the percentage of total P&P net expenditures devoted to aviation. In every case the percentages increased year by year, even in the face of an actual dollar decline in the total P&P expenditures during fiscal 1954 and 1955 (Table 1, Col. 2).

This clearly indicates a quickening interest by the Army in aviation and aerial delivery equipment, so essential in a day when maneuverability and lightning-quick thrusts are the pattern of attack.

Up to this point the amount and percentage of money expended by the Army for production and procurement of aircraft and aerial delivery equipment has been emphasized. An equally valid indication of the Army's increasing emphasis upon aircraft and aerial delivery equipment is gained from an examination of the net expenditures for research and development in this field.

Fiscal year	Total R&D net expenditures (millions)	Portion for aviation	% of total for aviation
1955 ...	$ 377.8	$ 8.0	2.1
1956 ...	413.8	12.0	2.9
1957 ...	435.1	16.3	3.7
Totals ..	$1,226.7	$36.3	3.0

TABLE 3—Total Army research and development net expenditures and portions devoted to Army Aviation R&D for fiscal 1955-1957 (in millions).

Data showing the breakout of research and development net expenditures for Army Aviation research are available for fiscal years 1955, 1956 and 1957. Prior to 1955, the portion of the total Army research and development expenditures devoted to aircraft research was not separately identifiable because aircraft research up to 1955 had been merged with research on missiles, anti-aircraft weapons and other similar projects.

Table 3 shows the R&D net expenditure data for the three fiscal years 1955-1957 for which the Army Aviation portion is separately identifiable.

This shows that during the last three fiscal years, approximately 3% of the total Army R&D net expenditures has been applied to research and development in Army Aviation. On the average, about $12 million per year has been expended during the past three fiscal years for R&D in Army Aviation.

A comparison of procurement and production net expenditures with R&D net expenditures reveals, very roughly, the relative emphasis Army has placed upon these two facets of aviation.

Fort Rucker sets tempo of Army's booming aviation role

FORT RUCKER, Ala.—Barometer of the rising tide of aviation in the Army is located here in the southernmost point of Alabama. A "ghost" Army camp just four years ago, Fort Rucker today has come back to life as the nerve center of Army aviation.

The sprawling 60,000 acres were recaptured from the boll weevils and peanuts in mid-1954 to make room for the Army's Aviation School after it burst its space barriers at Fort Sill, Okla.

In the past three and a half years, Army engineers have carved out a complex of fixed-wing and helicopter landing areas, combat practice fields and a maze of harrowing "booby traps" to simulate short and rough field operating area that an Army aviator might encounter in combat. A massive, restricted area triggers the artillery for tactical practice in target spotting.

Back at the fort, hundreds of once-deserted buildings are throbbing with activity that makes present and future Army aviation possible. Here aviators, helicopter transport pilots and maintenance technicians learn to apply flying skill to the Army's tactical needs.

But instruction is just one facet of the center's mission.

Research and development divisions that pump the new blood into Army aviation's arteries operate their generators from the post also. Plans for present and future air mobility are plotted here.

The Combat Development Office was established to develop new tactics, techniques and doctrines to meet the changes that new weapons demand in strategic concepts. Under the command of Col. Jay Vanderpool, the office collects, digests and evaluates all ideas on new equipment, organization, tactics and techniques. It serves as liaison with other tenants at the center, and with military and civilian research organizations.

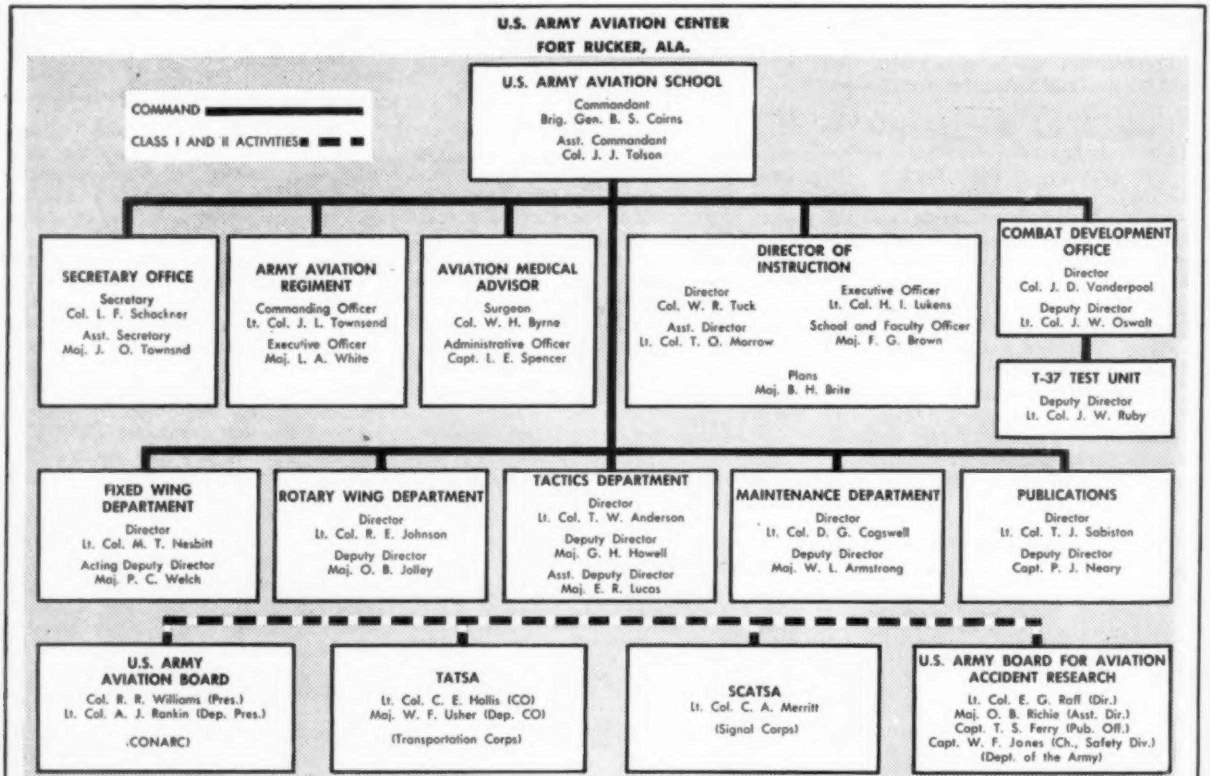
Aviation Development Board is charged with environmental testing of all aircraft and equipment before it is assigned to field units. It runs special tests that lead to new developments and maintains close liaison with all developmental agencies.

It follows a new development from its birth—when the Board writes the military characteristics—until its full growth and release to field units. Under direct control of the Continental Army Command (CONARC), the board is commanded by Col. Robert Williams.

Transportation Aircraft Test and Support Activity (TATSA) is charged with logistical evaluation. In a unique, highly accelerated program, TATSA determines life expectancy of new helicopter and aircraft components. The tests determine manpower and tool requirements for field maintenance and flying operation. TATSA, directed by Lt. Col. Charles Hollis, works closely with the Board on data exchange in a cooperative, intermeshing relationship.

Signal Corps Aviation Test and Support Detachment (SCATSA) is to aviation electronic equipment what TATSA is to components. Under command of Lt. Col. Charles Merritt, the Signal Corps unit primarily conducts accelerated tests on radio and navigational aids to determine durability.

U.S. Army Board for Aviation Accident Research, under Lt. Col. Edward Raff, is a Dept. of the Army function at the Center responsible for analyzing accident causes and initiat-



WEARING TWO HATS, Brig. Gen. Bogardus Cairns oversees the vast 60,000 acres that makes up Fort Rucker as commanding general and guides the school through its visual mission as commandant. Numerous support activities for the Center and regular Army activities (not shown) provide the vast network that makes Fort Rucker the West Point, Wright Field and Edwards AFB of Army Aviation.

BENDIX* IGNITION SYSTEMS—FOR THE BEST IN JETS

The powerful Curtiss-Wright J65 jet engine shown here is equipped with the Bendix TMGLN ignition system, the first self-contained ignition system to be developed for jet engines.

Produced by Scintilla Division of Bendix Aviation Corporation, it is one of a variety of types of ignition systems designed and manufactured by this division for the large, modern turbojet and turboprop engines.

The Curtiss-Wright J65 is one of the outstanding high-performance jet engines in service today and provides the power for a variety of high-performance military aircraft.

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ing corrective action. It has the power to order design changes, new flying techniques or other corrective measures.

Trained Board investigators conduct independent accident probes when requested or when accidents appear to be of special interest.

Human Resource Research Office was created by George Washington University and operates under Army contract. Its principal assignment is psychological research toward developing student capabilities. The group conducts job analyses, establishes proficiency measurements, develops and experiments with new training procedures.

But the Army Aviation School itself is the actual focal point of the huge establishment. In his dual role as base commander-in-chief and school commandant, Brig. Gen. Bogardus Cairns administers the destinies of the thousands of personnel—students and tenants.

Staff and faculty totaled 300 when school began at the Alabama installation in August, 1954. Today it is at a strength of 1,071. Numbers of graduating students have tripled with only 3,026 graduating the first year and close to 9,000 a year today.

Training aircraft have more than doubled in number and are almost at 13% of total strength. The school now boasts 350 rotary wing and 250 fixed-wing airplanes for basic training. At peak of training and testing activity for the entire center, close to 1,000 aircraft are in various stages of operation.

But the most frenzied activity comes from the Engineers. Construction of airports, housing, hangars and other priority projects is constantly under way. Since its opening, the near-wilderness has been converted into seven stage fields; 39 off-post fixed-wing landing strips, three aircraft maintenance and parking areas.

Most recently an auxiliary air field for fixed-wing activity was completed and work is progressing on a second. A large airfield near Ozark is being modernized and converted to accommodate the Aviation Board's testing facilities.

Thus, the Army installation, once destined to become a second string Army camp, now supplies the heartbeat of all Army aviation from doctrine through development, plus the all-important training activity. A far cry from the stepchild the airplane once was, Fort Rucker is a testimonial to the Army's new mobility concept: Mobility through the air in the age of nuclear warfare.

How Army tests its aviation equipment

ARMY'S ORGANIZATION for test and evaluation of aviation gear is as unusual as its employment of aircraft and helicopters. A CONARC (Continental Army Command) Board was specially created to test and evaluate all aircraft, related and support equipment and make recommendations on what to buy to the procuring agent.

The Army Aviation Board was born about 2½ years ago at Fort Rucker, Ala. The precocious infant inherited conception-to-death authority for constant testing, evaluating and surveillance of all Army aviation equipment requirements—from aerodynes through electronics to such mundane items as cargo nets, crash helmets, maintenance shelters and runway materials.

Under the administrative guidance of the Army's first master aviator, Col. Robert R. Williams, the Board is composed of the top military and civilian men in Army aviation. Organizationally, it is divided into a Test Division and Development Guidance Division. Officials like to describe their function as "shoppers" for the combat elements of the field armies.

"We have no money," one spokesman explained, "but we do do the shopping and then advise others what should be bought."

The Board's responsibilities include:

(1) Examination of military requirements for technical feasibility.

(2) Evaluation of existing equipment—both military and commercial—for possible adaptability to the approved requirements.

(3) Preparation of military characteristics when an Army-sponsored development is deemed necessary.

(4) Examination of technical specifications prepared by the technical services as the cornerstone for a new development.

(5) CONARC representative to evaluate model specifications prepared and proposed by the manufacturers and on development and prototype interservice committees.

(6) Development monitor for all developments from mock-up through prototype and engineering test phases.

(7) Responsibility for service tests which form the basis for type classification.

(8) Continuous use of standard equipment on which product improvements unsatisfactory equipment reports and engineering proposals are based.

"Only when an item is declared obsolete," a spokesman said, "does the Aviation Board's interest cease."

Major Board emphasis is on the service test. It is more vital to the Army than to the Air Force or Navy because of the aircraft support nature of ground battle.

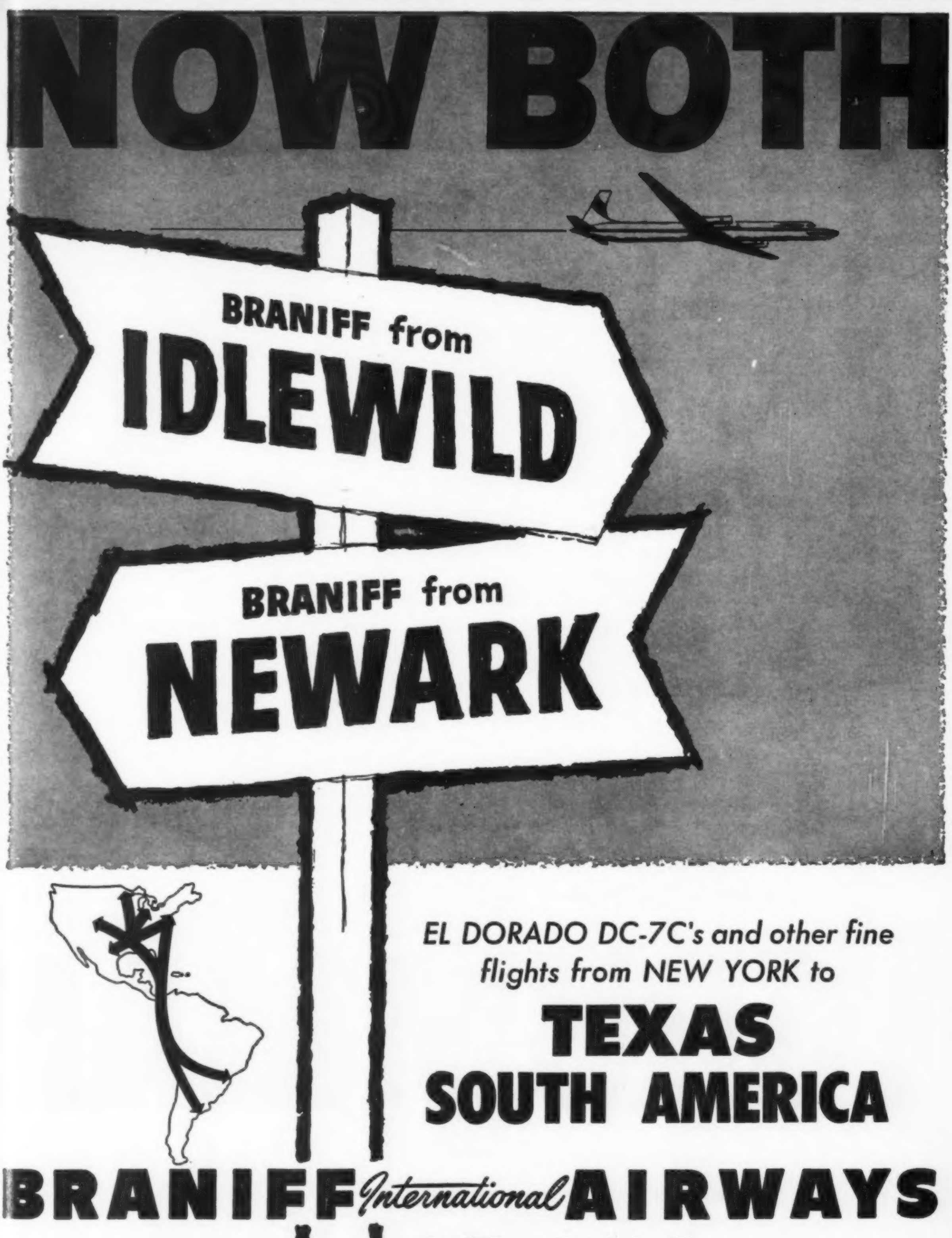
"The service test," according to one Board official, "is designed to determine an outward quality rather than an inherent equipment characteristic. It is thus a test in which the result is dependent to some degree on the skill and training of military operators. All conclusions from the test are oriented to the prime purpose of the test; that is, to determine the degree to which an item of equipment meets the military requirement as expressed in the military characteristics."

The service test is composed of three phases:

Phase I is aimed at determining flight characteristics, performance and deficiencies in equipment so that "fixes" can be made early in the production line. Test pilots fly for 50 hours in a

(Continued on page 47)

VERSATILE Vertol H-21 Shawnee tows disabled tank in Army Aviation Board tests.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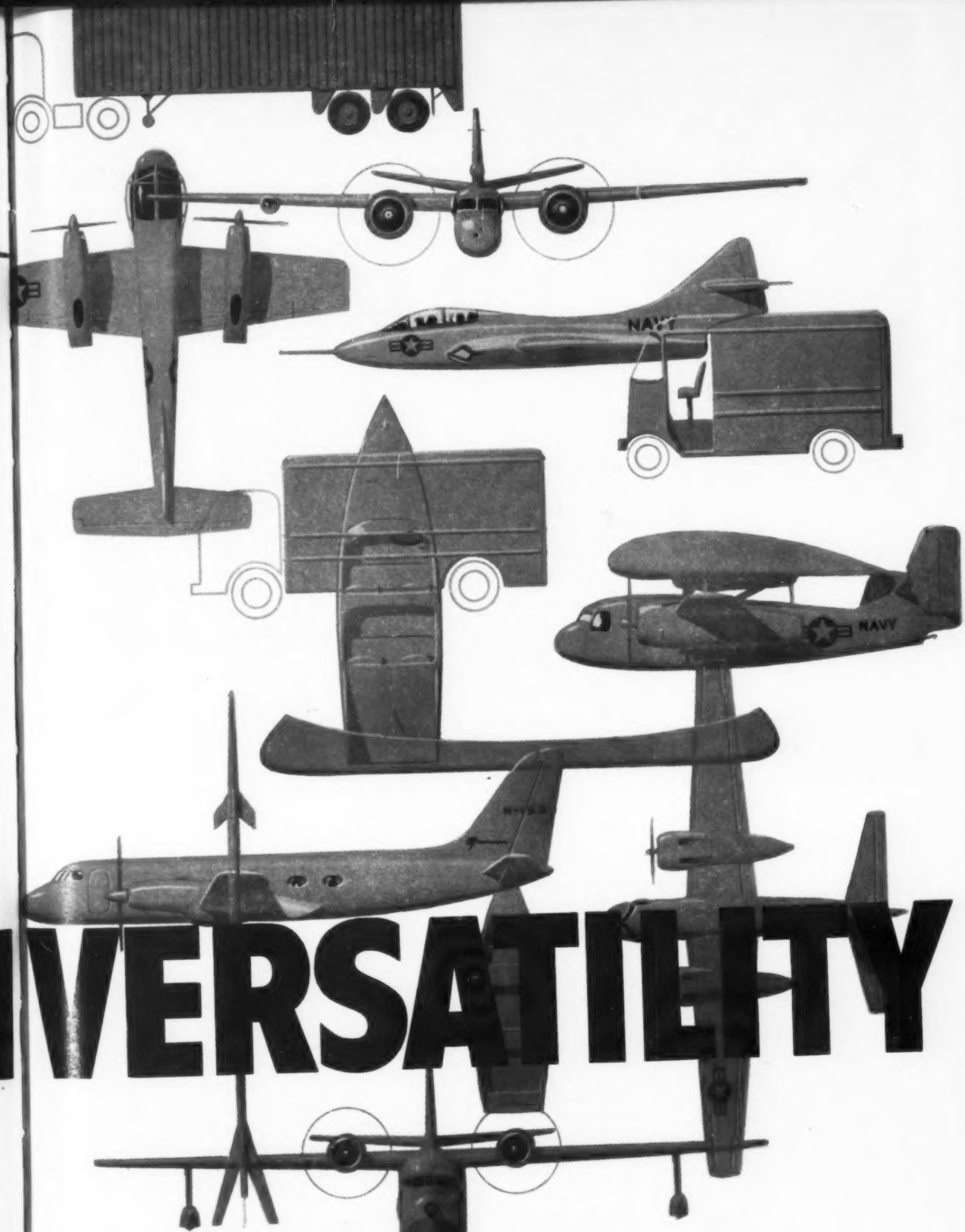

VERSATILITY

Ford Instrument Co. Engineer checks air-bearing gyro for angular drift on equatorial test stand. Test can show up drift rates as low as one revolution in 40 years. Tests like this . . .

helped Army put "Explorer" into orbit

Some of Ford Instrument's current or recent programs include:

- Inertial guidance systems . . . including Redstone and Jupiter
- Missile launching and control order computers
- Navigational and mission control systems and computers
- Analog and digital computer systems
- Fuzing, arming and other warhead control equipment
- Plotting equipment
- Nuclear systems and controls
- Gunfire controls
- Drone controls

A special guidance system for the Jupiter C, developed by the Army Ballistic Missile Agency, was used to launch the first U. S. artificial satellite into space.

Many components of this system were provided by Ford Instrument Co., prime contractor for both the "standard" U. S. Army Redstone and Jupiter guidance systems.

The fabulously-equipped, fantastically-clean gyro lab (above) is only a small part of the advanced research and development facilities available at Ford Instrument Co. They're used to create and produce the incredibly accurate control systems called for by modern technology in both government and industry.

And Ford Instrument's large-scale precision manufacturing facilities can turn even the most critical system requirements into working "hardware" on a quantity-production basis. Our Liaison Engineers are at your service to discuss your system requirements.

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(Continued from page 42)
ten-day period in order to expedite the "shakedown" since, more often than not, production contracts are awarded early in a new program, particularly in aircraft and helicopters. Production models follow right on the heels of the service test models without a break in the line.

Phase II is run to determine requirements and procedures for pilot and mechanic transition. It consists of 150 hours of flying over a 60-day period. Personnel with vast technical and operational backgrounds conduct the tests for the research needed for operation and maintenance of the equipment.

Phase III is the final section of the test and is conducted to determine the tactical suitability of the gear. It involves 150 or more hours of flying over another 60-day period. In the latter phase, the Board also tests out the suitability of the tables of organization and equipment that include the item under test.

While the early tests are conducted at Fort Rucker, the Board test personnel move out on location. The equipment is run out in the desert at a special site in Yuma, Ariz. to study effects of sand, dust and high temperatures. It is then moved to Fort Carson for operation in strong air currents and high altitudes found in mountain warfare.

The Board also conducts some environmental tests at Air Force facilities. And, in most cases, it determines what should be sent to the Arctic for the Arctic Test Board, based on results of cold chamber tests conducted at Eglin AFB. It also participates in environmental tests with other services and Army agencies.

Some of the major projects on the Board's agenda include:

Sikorsky H-37, twin-engine medium cargo helicopter, has been put through the mill. Tests began in January 1957. Numerous deficiencies were uncovered but, it is pointed out, that is the purpose of the service tests. The Board has concluded that the helicopter is good and, with the deficiencies corrected, will do a good job for the Army.

Bell H-40, first helicopter developed to meet a stated Army requirement, will begin its service tests next month or early May. Powered by the Lycoming T53, it is expected to be the first turbine-powered helicopter adopted by any U.S. service. Board test pilots have already concluded orientation flights at Bell's plant in Fort Worth and are ready to test fly two "Y" models scheduled for early spring delivery.

High-performance observation aircraft (HPOA) is scheduled to be tested in the summer of 1959 when the first service test models will be off the line at Grumman's plant. First prototype will fly this fall and the Board is closely monitoring the development prior to actual service test.

CESSNA L-19 Bird Dog with Whittaker tandem gear is being tested for Army use.


SIKORSKY H-37A Mojave undergoing test carrying Honest John rocket internally.

De Havilland DHC-4 Caribou will begin service tests early in 1959. First three of the five service test models on order will have piston engines and will be the first tested. Two others, which will be available at a later date, will feature turbine engines. No firm date has yet been scheduled.

Surveillance drones recently were assigned to Board jurisdiction and are just getting underway. Some modified Ryan drones will be tested originally to check concepts, to be followed by service tests of specifically developed drones.

Search for all-weather around-the-clock capability carries a consistently high priority at the Board. "In order for Army Aviation to become fully of age, the commander must consider his aircraft as reliable, day in and day out, as his trucks," officials declared. "So long as he must have a jeep around for use when his helicopter is grounded by darkness or fog, the helicopter remains a piece of specialized equipment, and budgetwise a luxury."

Self-contained navigation systems are viewed as an ultimate goal. The Board is participating with the Air Force in a joint evaluation of the several Doppler systems under evaluation and has written military characteristics for other elements of that system. But intensive effort is being directed toward an interim system:

(1) A lightweight GCA radar (AN/FPN-33) is under study. It can be airlifted by helicopter and placed in operation in a battle zone in the matter of minutes. Studies show a ground operator can bring a helicopter in for landing under zero-zero conditions and can provide normal landing assistance for fixed-wing aircraft.

(2) Search for solutions to the "cluttered" instrument panel involve a test of a Collins and Sperry integrated flight instruments systems, both commercial products. The program is expected to provide the Army with data for improved panel presentations for both fixed- and rotary-wing aircraft.

(3) Late in 1957, an intensive joint Army-USAF test of the APN-78 Doppler was commenced. A Board-

Designed for Dependability

Newest trainer uses proven WESTINGHOUSE turbojet

Within the last few weeks, the North American Aviation T2J-1 all-purpose jet trainer made its first flight at Port Columbus, Ohio. A Westinghouse J34 jet engine was the logical choice to provide the dependable power required for student pilots meeting the challenges of learning jet flight techniques.

The J34-WE-46 is an improved model of the basic J34 design which has accumulated over two million hours of actual flight operation. During this time, the engine has earned a reputation for combat reliability, serviceability and ease of maintenance. Its long overhaul life and high resistance to foreign object damage are further reasons why the J34 is an ideal power plant for workhorse-type applications.

The admirable service history of the J34 engine series proves the dependability of design, engineering and production at Westinghouse Aviation Gas Turbine Division, P.O. Box 288, Kansas City, Missouri. J-54045

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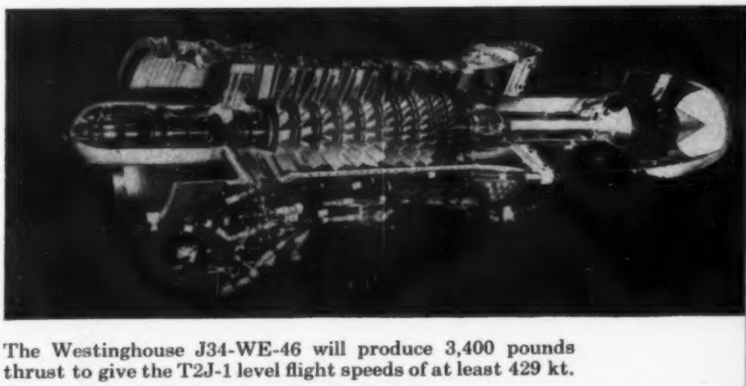

The Westinghouse J34-WE-46 will produce 3,400 pounds thrust to give the T2J-1 level flight speeds of at least 429 kt.

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owned H-21 has been equipped with an Air Force-procured system and an Air Force H-19 is similarly equipped. Air Force and Army pilot teams are flight-testing the two helicopters at both Fort Rucker and Eglin AFB.

Collaborating with the Board are two vital support elements provided by the Transportation and Signal Corps. Both units—Transportation Aircraft Test and Support Activity (TATSA) and Signal Corps Aircraft Test and Support Activity (SCATSA) service the Board logistically through maintenance of all aircraft and electronic gear. But apart from the logistic support both are charged with important test missions for their respective services. The two detachments conduct logistical evaluations of aviation equipment for their services . . . TATSA for maintenance of aircraft and helicopters and SCATSA for maintenance requirements of all electronic equipment. Together with the Board, the two units cover every field of Army aviation test activities. Interchange and cooperation provide probably the most comprehensive service program of any military service.

Revolutionary body?

TATSA is just one year old but already shows promise of becoming a revolutionary body. Its accelerated flight-test program is an entirely new approach to logistical evaluation. Although popularly known as the "1,000-hour test," the program is not that rigid. Objectives are to: (1) obtain a more realistic picture of requirements for field support both in spare parts and manpower and (2) raise time between overhauls to the maximum.

Expected savings in the possibility of a truly realistic spares procurement program has the Army exhilarated. It has been found that early estimates, on which spare procurements have been based, were as much as 85 to 90% off. Short experience with the unique test program indicates that the Army will be able to now "guesstimate" within 25% of the life of the aircraft involved. Since it takes about 800 line items to support one aircraft type, potential savings are of major magnitude.

Side benefits, not originally anticipated in the test program, will be TATSA's ability to edit manufacturers manuals from actual experience before the aircraft are in full field assignment.

TATSA receives its evaluation models about the same period that the Board takes delivery on its service test models. TATSA's high time program has been invaluable to the Board in catching defects very early in a program. Under this system, redesigns can be started immediately.

Here's how TATSA operates: By flying a minimum of 50 hours per week 1,000 hours can be accumulated on a new aircraft in under six months. It takes about three years to reach that goal in field use. Component life can be determined in four to six months under the control system. The heavy intensive flight time allows the Transportation Corps to determine quickly how many skills are needed for field support and how far components' life cycle can be increased. Dominant deficiencies are quickly uncovered. Time studies on parts and evaluation and design of tools are important elements of the program.

Tests located miscalculation

The Sikorsky H-37 was TATSA's first major program. TATSA was able to recommend increase on all component times by 100% to 500% as result of its 1,000-hour tests. Exception was the blades. TATSA found that a mathematical miscalculation had pulled the guaranteed blade-time down. The blade is now being redesigned on the basis of the findings.

To simulate field conditions as truly as possible, TATSA utilizes inexperienced student pilots throughout many phases of the accelerated program. Mixing inexperienced with experienced pilots allows the unit to put the hardest, most realistic wear on the equipment for maximum effectiveness in preparing maintenance and support doctrines.

TATSA has devised its own supply system and has power for direct manufacturer contacts. Like the Board, TATSA continues tests on equipment in field use for changes and new support systems in constant surveillance.

Office of Combat Development

'Mission Blue Sky'

While the Aviation Board, TATSA and other groups at Fort Rucker work within the confines of known realities and immediate practicalities, the Office of Combat Development is charged with probing the intangibles of the far future. The commanders like to describe their group as being up in the "blue skies on cloud nine" but their crystal-balling today may result in the air Army of tomorrow.

The office, attached to the Aviation School, is officially assigned the mission of writing doctrines, conceiving methods of employment, developing tactical organizations of the future and providing for their field test. Simplified, Combat Development is responsible for the beginning of the future. The doctrines are the concepts that lead to the organization and to the equipment that must follow.

In this nerve center, germinate the ideas that ultimately will allow the Army to have vehicles that "leave no footprints": ducted fan machines, deflected slipstream and boundary-layer-control applications —and all the early stages of technology that will give the Army ever increasing speed and maneuverability to mass and disperse troops quickly. Here the future vehicles are taking imaginative form for later translation into hardware by the responsible agencies. Here imagination foresees future "zero ground pressure" vehicles that will make maximum use of airspace in limited areas. Here the complexion of Army Aviation will be changed by doctrines that will give birth to a new concept that will no longer be called aviation as it is known today.

But it is not "blue-sky missions" for the sake of blue-sky missions. A purpose evolves. Examples:

Skycav—the concept for arming helicopters to provide suppressive fire has had its birth in Combat Development. The concept is to have an armed vehicle move the man, fight with him and move on. It has been accepted as tactically possible, but a doctrine has not yet been authorized by CONARC. But in a small area fenced off at Fort Rucker a small contingent is stripping down helicopters and experimenting with installation of rockets, machine guns and other modern weapons on every available rotary-wing platform, from the H-21 to the Bensen one-man helicopter.

Material problems—man must be protected from radiation, heat and fragmentation. Combat development has conceived a doctrine for known requirements which is expected to cover the next 20 years.

Combat zone air traffic control—a doctrine for an interim system for tactical uses has been drawn. It will be fully tested during Operation Gulfstream. It is composed of beacon-to-beacon, semi-mobile, low-medium frequency ranges with terminal assist by GCA. Under study are concepts for terrain clearance, obstacle devices with Signal Corps conducting actual tests.

High performance observation aircraft—feasibility of high-speed jet aircraft for observation now under test. Office has been assigned three Cessna T-37 jet trainers. The aircraft are being used to test the concept on which an ultimate doctrine and organizational structure will be built.

Interview with Army's No. 1 Aviator

(Note: The opinions expressed in this interview are the personal views of Col. Williams and do not necessarily reflect the official position of the Army or the Army Aviation Board.)

Col. Robert R. (Bob) Williams, president of Army's Aviation Development Board, unquestionably earns the title of "Army's No. 1 aviator today." One of two master aviators in the Army, his service in aviation dates back to early World War II and the birth of flying tactics that developed into what is Army Aviation today. How does Col. Williams fit this picture? One close observer says, "Col. Bob Williams is Mr. Army Aviation today—they can't make him a general fast enough."

COL. ROBERT R. WILLIAMS
"Can't be made a general fast enough"

Q.: Gazing into your crystal ball, would you sum up future effects of aircraft, helicopter and advanced air vehicles on overall Army missions?

A.: For the first time, it looks as though we will have the capability to get fighting soldiers to the scene of the conflict and keep them there without a massive, lumbering, logistical organization behind them. Everyone is familiar with the outrageous ratio of supporting troops to combat soldiers in the past. We are now rapidly approaching the time when commanders will be willing to give up those extra jeeps and trucks and their base areas, logistical reserves, and pipelines heretofore required to support the fight. No longer can we afford the vast base areas, communication zones and port commands, or the years to build transports, freighters and tankers.

We can now look forward to the time when soldiers will leave their base, fly to where they are going to fight, use their vehicles for ground mobility, be completely resupplied by air lines of communication and then fly out again. Survival on the atomic battlefield will depend on wide dispersion of the fighting elements. Success will hinge on the ability to control and quickly concentrate these elements. *Army aviation will be an essential part of this ability.*

In peacetime no less than wartime, aircraft and advanced air vehicles will enhance the traditional Army missions of services to the United States.

Q.: Under present budget conditions, what would you term a realistic timetable for advanced Army air vehicles?

A.: This question can only be answered by first defining "advanced Army air vehicles." Such a vehicle is considered to be a conventional, turbine-powered, fixed- or rotary-wing aircraft, or a vehicle employing jet or turbine power for direct thrust lift, or a combination of these powerplants mated with aerodynamic shapes of some sort. It is true that the present financial environment imposes some restrictions on the speed with which this development can be accomplished, but by selective development and research and by trading time for money, the required result eventually will be achieved.

Unless there is an emergency sufficiently grave to justify much larger expenditures, such advanced vehicles are not likely to be in the active field Army in less than five to ten years. It is important to remember that the Army must proceed with its modernization in steady, but clearly defined steps. The best that is conceivably obtainable at any given time through R&D must be weighed against the need to be ready to fight now, whenever *now* happens to be. Therefore, no radical change from one concept to another is likely. Rather, the Army must move forward by a series of ever-ascending plateaus of capability; each of which must be entirely practical and upon each of which the Army must stay until the next clear, profitable advance can be phased into the system with a minimum of disruption of the basic capability.

Q.: What role could or should industry play to help speed up the cycle?

A.: Industry can best help by keeping in mind that the Army's air mobility needs are tied most closely to those of general aviation and the reasons why private industry, private businessmen and large corporations use aviation essentially are the same reasons why the Army uses aviation—to accomplish a job better and faster.

Q.: Do you feel the Defense imposition of an airframe weight limitation on Army aircraft is realistic?

A.: I do not believe that an airframe weight limitation is realistic. It would be just as valid to place an airframe weight limitation on all Marine aircraft to assure that the Marines did not duplicate the capabilities of the Navy, or to pass a law stating that no large business would operate any aircraft over some empty weight because they would duplicate capabilities of the airlines.

Decisions on aircraft to be operated by Army aviation should be based entirely on what types and sizes are required full time for missions within the Army area *that must be under the command and control of the Army commander*. The present empty weight limitation of 5,000 lbs. for fixed-wing aircraft provides a terrific void between the largest fixed-wing aircraft authorized for the Army and the smallest being developed by the Air Force.

The 20,000-lbs. empty weight limitation on helicopters is not inhibiting the Army at this time, but serves no useful purpose. None of the services at this time are operating or developing helicopters in excess of the 20,000 lbs. empty weight limitation imposed on the Army.

Since the Air Force operates no helicopters in support of the Army, this limitation cannot be justified on the basis of preventing duplication.

Unless the Secretary of Defense continues to grant waivers on the weight limitation, such as he has in the past for the Grumman Mohawk and deHavilland Caribou, effective development of Army aviation will be seriously impeded by continuation of the empty-weight limitations.

Q.: What would you cite as the number one development problem facing Army aviation today? What is the status of airway and air traffic control aids for battlefield use?

A.: The primary development problem facing Army aviation today is to provide a means of accurate, secure, self-contained, low-altitude navigation which includes an "all-weather" capability of operating aircraft under environmental conditions at least as bad as those under which the foot soldier and the tank can operate.

Airway and air traffic control aids for battlefield use are still limited to the tried and true, low- and medium-frequency ranges and beacons that aviation has used from the earliest days of the electronic age. Our scientific and industrial minds have not yet devised anything that will operate close to the ground with the required range that is better than the low-frequency radio.

However, under development is a navigational system which will be self-contained and give reasonably accurate navigation capabilities without reference to any outside aid. Also under development are terrain clearance indi-

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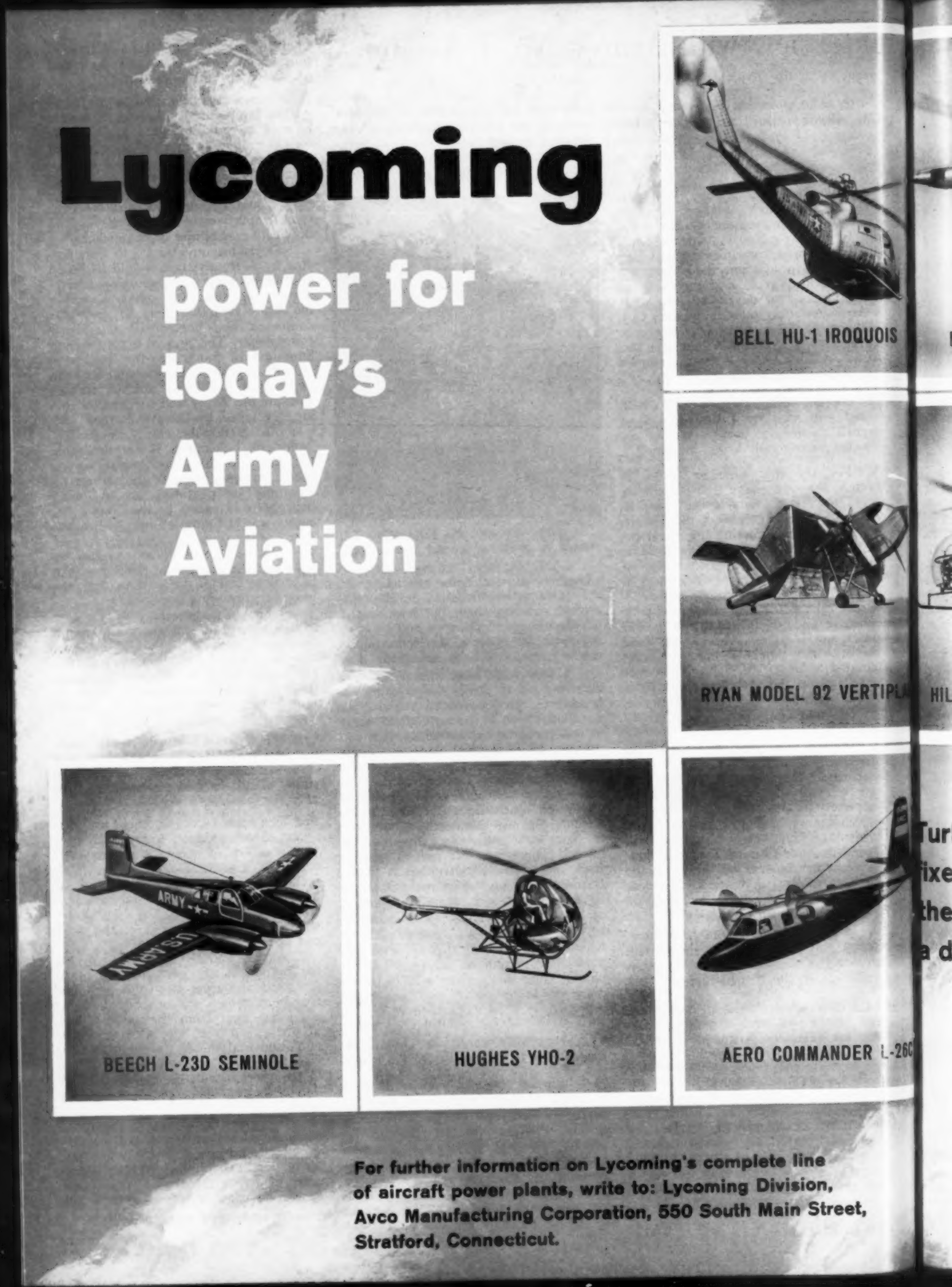

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(Continued from page 51)

cators, air traffic viewers and other obstacle warning devices. These should all be in use within five years.

In the meantime, however, we are using the presently available means to develop the concepts, procedures and techniques that will be required for the more exotic and highly sophisticated equipment under development. The Army recently has organized identifiable, separate organizations for the control of air traffic in the battle area.

Q.: When and how did Army aviation within the concepts known today get its start?

A.: Army aviation officially claims June 6, 1942 as its birthday. This is the date on which the War Dept. authorized organic aviation for the Field Artillery. Out of this, present Army aviation has expanded and grown.

There are, however, many who will claim that the true beginning of Army aviation was in the early 1900s when aircraft were first made organic to the Signal Corps. There is a certain degree of validity in this claim, for the basic mission of aviation in the Signal Corps in the very early days was the same as one of the basic missions of Army aviation today—that is, providing the ground commander with air reconnaissance immediately available and under his command. I believe the best analysis is to state that the Army aviation and the U.S. Air Force began from a common point rather than contend that Army aviation had its true beginning in the early 1900s. Some extremists maintain that Army aviation initiated with the balloon flights of Thaddeus Lowe in the Civil War.

Q.: How can the armored, airborne and infantry divisions be best educated and convinced of the growing importance of Army aviation?

A.: It is not a question of educating or convincing armored, airborne and infantry divisions of the growing importance of Army aviation—they are already convinced. It is one of integrating the capabilities of Army aviation into the missions of these arms.

Basically, the mission of the Army, to fight and win its wars on the ground, has not changed; and is not likely to change. The means which all armies have always used to accomplish this mission are mobility and fire power.

On the modern battlefield, tactical atomic weapons provide the required fire power. Only through aviation, or air vehicles, will the needed companion, mobility, be provided. The methods and techniques of utilizing this increased mobility are what must be developed.

Q.: Certain areas of Army aviation appear to overlap with the Air Force causing charges of infringement on the USAF mission. Is there a clear-cut answer to refute this?

A.: There may possibly be areas of overlap, but the overlap is a healthy one. There is no infringement nor wasteful duplication between Army aviation and the Air Force. Army aviation meets two clear-cut requirements. It provides aircraft that are required on a full-time basis to meet an *Army* mission. Second, it provides those aircraft that must be under the direct command and control of the ground commander for him to accomplish efficiently the objectives of ground combat.

There are overlapping elements of the Air Force used in support of the Army. But these are not provided on a full-time basis nor are they under the command and control of the Army.

As a result, they are not responsive to the immediate needs of Army forces.

For example, the entire reconnaissance capability of the Air Force falls far short of meeting the needs of both the Army and the Air Force. Experience has shown that the only way the Army can receive the aerial reconnaissance it requires is to command and control aircraft involved and design those aircraft for the Army mission. In the same way, the troop carrier aircraft of the Air Force are used only a small portion of the time in support of the Army. The rest of the time they are used to accomplish missions in support of the Air Force.

Logistics: lifeblood of Army Aviation

ST. LOUIS, MO.—This is the logistical heart of the Army's aviation program. Here, commodity managers, under Brig. Gen. William B. Bunker, a pioneer in development of Army helicopter usage, man the headquarters, Transportation Supply and Maintenance Command (TSMC).

It is here that repair parts and maintenance know-how is gathered, then sped to aircraft and personnel from the Arctic Circle to the tropics.

Roughly half of the more than 1,700 officers and civilians in the headquarters are concerned primarily with aviation—the balance with surface equipment. TSMC is responsible for supply control, procurement, maintenance, engineering and production aspects of the Army aviation program.

Problems are legion in this business of keeping Army aircraft flying, particularly in the case of helicopters. Advanced business methods are helping solve them.

An example is the forecasting of requirements for spare parts. A big assist has come from the employment of actuarial analysis to high-value items identifiable by age and which fail by age. This science of "life expectancies" has enabled technicians to more accurately forecast equipment removals, particularly in the case of engines, and has resulted in better analysis of maintenance problems.

Sore point: lack of information

Increasing the service life of time-change components has been a problem to logistical planners. Lack of information on new equipment entering service has been a particularly sore spot. A solution to this is the accelerated testing program begun approximately a year ago.

A subordinate unit to TSMC, the Army's Transportation Aircraft Test and Support Activity, Fort Rucker, Ala., was established to conduct these tests. Last August, a Sikorsky H-37 Mojave became the first aircraft to complete a test, with a total of 1,000 flight hours in six months. This is the equivalent of three years' normal usage.

As a result of this test, numerous modifications were made on production aircraft at the factory, precluding the later need for retrofit by field units.

Supply practices watched closely

Close scrutiny has been maintained on supply practices in order to keep costs of an inherently expensive program to the minimum. Army efforts for some time have been directed towards maintenance of a minimum inventory of operating stocks, and stocks that are related to consumer demand. The mobilization inventory is maintained on a sound relationship to the production base, production lead time, and to anticipated requirements. The distribution system provides a minimum pipeline requirement and is geared to provide supply support with maximum speed.

The Army has made maximum use of available shelf stocks and civilian industry's distribution system to reduce its depot distribution costs and operating inventories to the minimum.

Use of the Army Field Stock Control System, with its improved management of station stocks, has resulted in a reduction of approximately 67% in Transportation air items stocked at stations in the U.S.

Automatic data-processing is becoming increasingly effective at TSMC. When this system reaches its maximum capability, it will offer the nearest approach to a "pushbutton" supply system that Army aviation has had, eliminating much of the time lag inherent in earlier systems.

Army aircraft are procured through the Air Force and Navy with Army funds and according to Army specifications. Repair parts often are procured directly to reduce lead time and administrative overhead. The procuring service also provides the necessary technical engineering assistance.

The Army provides its own depot maintenance in the U.S. primarily by means of contracts with commercial firms, and through cross-servicing with USAF and Navy.

Depots supplying aircraft spare parts are located at Atlanta, Ga.; Fort Worth, Tex.; New Cumberland, Pa., and Lathrop, Calif. Atlanta services the Third Army area, a high density area for Army aircraft. Fourth and Fifth Armies are supplied from Fort Worth, Sixth Army from Lathrop, and First and Second Armies from New Cumberland.

The latter depot also stocks aircraft and repair parts for Europe, with Sharpe General Depot at Lathrop doing likewise for the Pacific and Far East. Stocks for overseas areas supplied from Gulf ports are stored at Fort Worth.

TSMC, as the stock control center, receives requests from users and directs shipments. The General Depots store, maintain and ship as necessary.

Logistical difficulties facing the Army as operator of a large fleet of helicopters are readily apparent to anyone familiar with the helicopter industry.

Aircraft support is a partnership affair between industry and the military. *It is one to which many aspects of the Weapon System Concept will be applied.*

Several thousand Engineering Change Proposals (ECP's) are received at TSMC each year, as an indication of the constant need for refinement and improvement of existing aircraft. Chairman of the committee that studies such proposals comes from TSMC. This arrangement insures that the impact of changes on the supply and maintenance systems will be fully considered.

Local procurement helps

Reduction of inventories through the maximum use of local procurement is another TSMC objective, which further increases effectiveness of the supply system by freeing it of minor items. When items coded for local procurement cannot be purchased overseas, the requirement goes through Army channels to the respective Overseas Supply Agency, located at San Francisco, New York, or New Orleans. The requirements are then forwarded to TSMC for procurement and supply action by the headquarters.

Implementation of the depot command management system has given the Army another tool with which to improve its financial management. As a

MODEL aircraft maintenance shop at Fort Eustis, Va. provides field maintenance and supply support to more than 100 aircraft, tests and evaluates new concepts, equipment and maintenance procedures.

1,000 pilots helped Sperry design this

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result, the Quartermaster-General, as commander of all general depots, budgets, funds and performs against programs given him by the Chief of Transportation.

TSMC's maintenance responsibilities are, like its supply program, global in scope. Aircraft maintenance is divided into five echelons: i.e., depot or fifth echelon, which is major overhaul or rebuild; field maintenance, comprising third and fourth echelon maintenance, which includes repair and replacement of unserviceable parts, subassemblies and assemblies; and finally, organizational maintenance, comprising first and second echelon maintenance—day-to-day preventive maintenance—which the user performs.

Depot level repairs within the U.S. are performed either by contract with commercial concerns or via cross-servicing agreements with the Air Force and Navy. Transportation sections of the four depots are equipped with shop facilities to handle fourth echelon back-up maintenance which is beyond the capability of field maintenance activities within the six continental army areas. This includes repair and replacement of unserviceable parts, subassemblies, painting and inspections.

Depot maintenance in oversea areas is performed by contract, Transportation Army Aircraft Maintenance Battalions, through cross-serving agreements with the Air Force and Navy, or by return of components to the U.S.

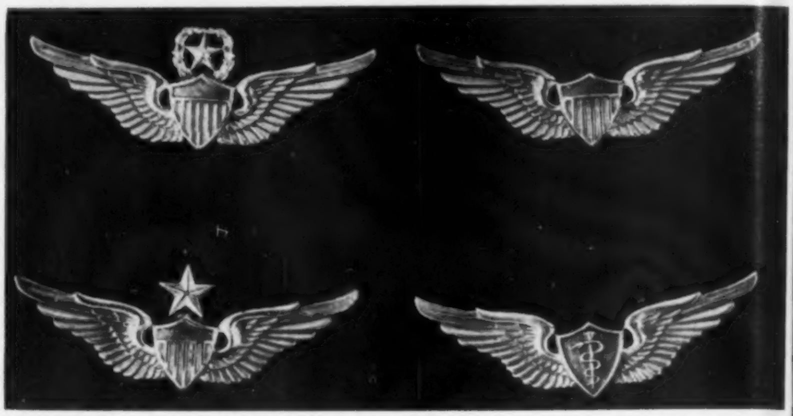
TSMC budgets and programs SCAMP (standard configuration and modification program) in the U.S. This is the successor to IRAN (inspection repair as necessary). Work is performed under contractual agreements with contractor-furnished parts and/or with government-furnished repair parts and modification kits stocked in the TC supply system. Army policy requires contractors to furnish parts and tools, when feasible.

A supplement to resident school training for maintenance personnel is the Army Aircraft mobile technical assistance program, by which teams under contract from manufacturers are providing classroom and practical instruction to Army mechanics at nearly 50 stations throughout the U.S.

Aviators . . . not pilots—Badges . . . not wings

Army aviation is distinct from airpower even to the extent of designating the men who fly Army aircraft and the insignia they wear.

Today Army has four classes of aviators with special badges to distinguish these ratings.



MASTER Army aviator's badge is at upper left, regular Army aviator's badge upper right. Senior Army aviator's badge is at lower left, Army Aviation flight surgeon's badge lower right.

The school is being brought to the scholar, with each team teaching one type of aircraft. The curriculum includes the H-13, H-19, H-21, H-23, H-34 and L-23. Selection of teams was on the basis of complexity of design, maintenance techniques, dispersion within the U.S. and requests for technical assistance.

Organizational maintenance only is taught and the program has received an enthusiastic response from field commanders.

A model aircraft field maintenance shop at Fort Eustis, Va., was assigned to TSMC in October. This shop provides field maintenance and supply support to more than 100 aircraft, tests and evaluates new and revised concepts, equipment and maintenance procedures, and serves as a model for other aircraft field maintenance activities in the U.S. There are approximately 60 personnel in the shop.

Army technical and supply bulletins are prepared at TSMC, printed commercially, and distributed to users within a week or two after printing, to aid maintenance men around the world who must have the latest information in order to do their job properly. This is the most rapid distribution system for such materials that the Army has ever had.

A further maintenance aid is the technical representative program administered by TSMC. Technicians from the various manufacturers are stationed throughout the world to provide maintenance assistance wherever required.

The Federal cataloging program is also conducted at TSMC, with part of the work being done under contract. Results of this program will help provide a more smoothly operating supply system.

Proper repair parts provisioning is a "must" for proper supply. Provisioning conferences are team affairs, with TSMC and the manufacturer cooperating to insure that parts are readily available as they become necessary.

Every part of the aircraft is reviewed, source-coded and assigned a maintenance level, with the result that the user is never in doubt as to his source of supply. Repair parts for helicopters and fixed-wing aircraft total roughly 12,000 and 8,000 stocked items respectively. Provisioning provides answers to questions on the responsibility of: (a) procurement by the supply service of the item; (b) manufacture of the item by the maintenance or depot activity; or (c) that the item should not be requisitioned but procured locally.

Application of modern business principles and teamwork between Army and manufacturer have done much for aviation logistics.

Exclusive report

What's behind Army's turbine engine program

by George V. Hart

ARMY's turbine engine development program may not be as dramatic as Air Force and Navy high-thrust jet activities. Nevertheless, the engines that will result show promise of taking as important a place in the overall U.S. turbine picture.

From Don Weidhuner, Army's assistant technical director of aviation powerplant R&D, AMERICAN AVIATION learned first details of the quiet but methodical approach being taken to turbine power Army's future helicopters and support aircraft.

Decision to launch this program stemmed from the fact that engines under development in 1951 were in the range of 2,000 shaft horsepower and up. Army required engines of much lower ratings.

Starting with the 825-960-shp Lycoming T53, Army's effort has mushroomed to higher and lower power categories.

Today, the program includes the Lycoming T55 (1,600-1,850 shp), a 250-shp engine now in design competition and a 55-shp Solar T66. Still to come is a 500-shp project, but this is further down the road.

Development contract for Lycoming's T53 was awarded in June 1952 as the result of a design competition. This started as a joint Army/Air Force project; however, Air Force dropped out shortly after the ball got rolling.

Today the total development cost of the T53 runs around $20 million, including $4 million in Air Force funds. Progress with this engine has been slower than normal due to power increases made during development. However, the helicopter version has been flying since September 1956 and Lycoming expects to complete 150-hour qualification tests in March or April of this year.

Army has considered using General Electric's Navy-sponsored T58, Weidhuner said, indicating this engine is available for use as a back-up if the T53 fails to live up to expectations for some reason.

He pointed out that when an aircraft is assigned to a combat unit at the front it operates under most adverse conditions. Not only is it subjected to extremes of sand, dust, etc., but it is distant from well-equipped overhaul shops. Consequently, Army's engines must be exceptionally rugged, reliable and easy to maintain.

Specific fuel consumption of the T53 is higher than that of the T58, Weidhuner concedes. However, this is not considered important in the Army's two-hour type of mission.

Simplicity of the T53 should make it cheaper than the T58, Weidhuner added, and noted that, although the cost of the first 18 production engines was around $125,000 each, it is expected that, with increased production, the T53 will price out at about $50,000.

Lycoming officials say the company hopes to bring the cost down to $30,000 in mass production quantities (1,000 and over). A recent production order called for 27 engines priced at $89,700 each.

Next engine to receive Army's attention was Lycoming's T55. Air Force initiated development of the 1,600-shp turboprop version in 1954, had spent $3 million when Army took over in 1956. Since then, Army has put another $14 million into the project.

Army continued development of the turboprop T55 which completed its 50-hour preliminary flight rating test recently. Helicopter version of the engine is expected to complete the 50-hour test by the end of the year. In addition, Army has just initiated work on up-rating the helicopter version to 1,850 shp.

Army has considered powering the de Havilland Caribou twin-engined transport with the T55, Weidhuner said, and would install it in helicopters of two to three tons load capacity. However, until an application is firmed up, the engine is funded through the 50-hour tests only.

At the low-power end of the scale, Army has turned to Solar Aircraft in San Diego.

This started as a joint project with Navy, which is interested in a 55-shp

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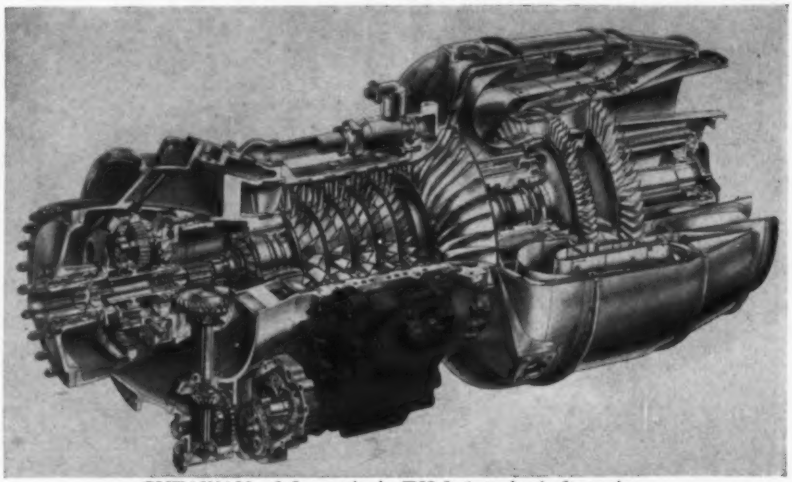

CUTAWAY of Lycoming's T53-L-1 turboshaft engine.

Specs on Lycoming's T53 and T55

Engine	Ratings	Shp (min.)	Jet thrust lbs. (min.)	ESHP (min.)	Output shaft RPM	ESFC lb/ESHP/hr (max.)	Weight (lbs.)
T53-L-1	Military	825	100	865	6680	.673	480
Heli-	Normal	770	96	808	6610	.689	
copter	90% normal	693	89	729	6320	.706	
	75% normal	578	78	609	5900	.748	
	Takeoff	960	113	1005	1700	.655	495
T53-L-3	Military	900	107	943	1700	.661	
Turbo-	Normal	825	100	865	1700	.677	
prop	90% normal	742	93	779	1680	.693	
	75% normal	619	82	652	1570	.730	
T55-L-1	Takeoff	1600	190	1676	1320	.648	695
Turbo-	Military	1460	179	1532	1270	.666	
prop	Normal	1325	168	1392	1230	.685	
T55-L-3	Takeoff	1600	190	1676	6230	.648	600
Heli-	Military	1460	179	1532	6030	.666	
copter	Normal	1325	168	1392	5800	.685	

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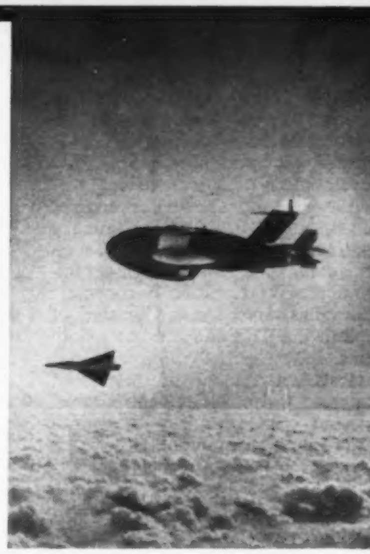
Ryan's Firebee jet drone is the nation's most realistic target for evaluating the performance of air-to-air and ground-to-air missiles. It flies at near-sonic speed, to 50,000 feet altitude—closely simulating an actual enemy airplane or missile.

The Firebee is remotely controlled to perform any desired maneuver or evasive action.

The hot, high-flying Firebee, in full production at Ryan, has made more than *750* operational flights.



A Convair F-102 chases the Firebee high above Eglin Air Force Base.

RYAN-BUILT ROCKET ENGINES POWER ARMY GUIDED MISSILES

Army surface-to-surface guided missiles get their tremendous burst of power from liquid propellant rocket engines built by Ryan. Ryan has been building rocket engines on a production line basis for more than six years. The company's missile experience dates back to 1946, when Ryan designed and built the Firebird—the Air Force's first air-to-air missile.

Ryan has complete capability—from research and development through quantity manufacture—for complete rocket engines—both solid and liquid propellant types.

RYAN DOPPLER NAVIGATORS NOW IN PRODUCTION FOR NAVY AND ARMY

Navy jets and Army light planes and helicopters will soon be equipped with Ryan's new lightweight automatic navigators. The completely self-contained continuous-wave radar systems give pilots true ground speed, distance traveled, drift angle, deviation from course, and latitude and longitude.

These new automatic navigators represent just one area of Ryan's diversified capability in advanced avionics—including a wide range of systems for manned aircraft, guided missiles, helicopters and airships.

RYAN BUILDS BETTER

AIRCRAFT · POWER PLANTS · AVIONICS

Ryan Aeronautical Company, San Diego, Calif.

(*Continued from page 59*)

turbine for one-man helicopters. Army soon broke away from the T62 being developed for Navy, feeling that this fixed-turbine engine is unsuited to Army requirements.

Army has put about $600,000 into development of a free-turbine version of the T62—the T66. This engine, funded through 40-hour preliminary flight rating tests, will be used in such aircraft as Hiller's Pawnee flying platform and the De Lackner Aerocycle.

Navy has put a similar amount of money into the T62 and monitors both programs.

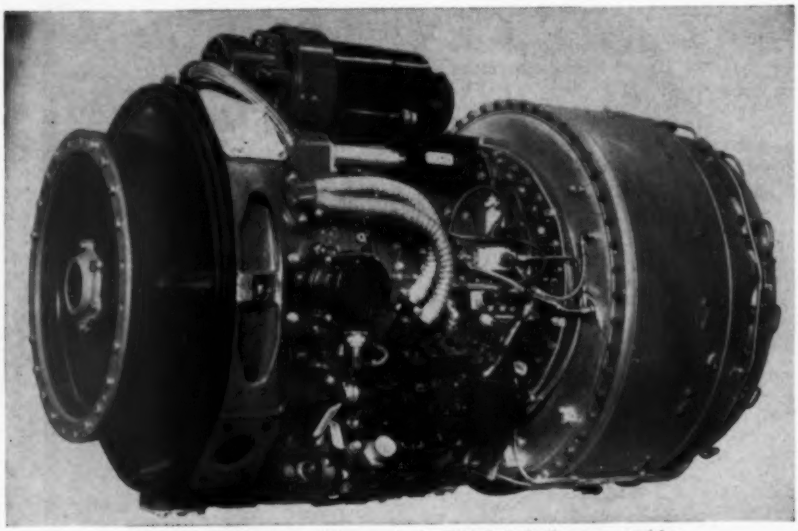
Latest Army step is the release of invitations to bid on a 250-shp engine. This design competition is the result of a $220,000 study conducted with fiscal 1956 funds. Studies were made by Continental Motors, Lycoming, Turbomotor Division of Curtiss-Wright.

A fourth study was conducted by Utica-Bend Corp., subsidiary of C-W. Latter study was assumed by Utica-Bend along with other government contracts held by Studebaker-Packard.

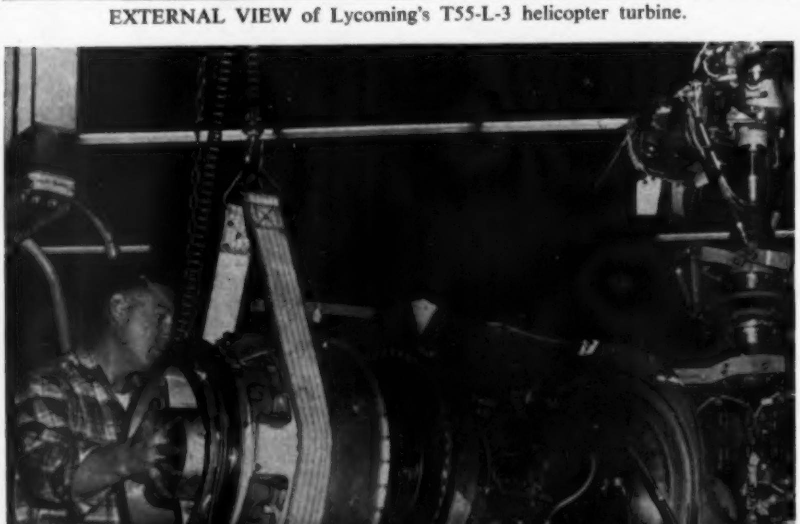
The 250-shp engine is expected to weigh about 100 lbs. and will be used in liaison aircraft, aerial jeeps, two-place helicopters, etc.

Deadline for bids is March 10 so that the development contract may be awarded by the end of fiscal 1958 (June 30). No procurement figures are available at this time.

Whether or not Army will develop a 500-shp engine will depend upon quantity requirements. Current Army thinking is that power could be obtained by coupling two 250-shp engines through a common gear box; however, large-scale production would warrant a new engine. Such development, if necessary, would be launched around fiscal 1960.



EXTERNAL VIEW of Lycoming's T55-L-3 helicopter turbine.



T53 HOT SECTION can be removed as a unit for inspection.

Plans for the future include more than the continuing search for better engines. For example, General Electric's Aircraft Gas Turbine Division at Cincinnati is conducting a $250,000 Army-sponsored study to guide future development of engines for VTOL aircraft.

Need for this Army R&D program is demonstrated by wide application of most advanced project, the T53.

Lycoming's T53 has run more than 5,400 test hours. Of 825 hours of installed running, 378 have been in flight and 350 in required tie-down testing.

Installed testing of the T53-L-1 helicopter version has been accomplished in six aircraft. A modified Kaman HOK rescue helicopter is being flown by Lycoming. Bell is flying the H40 (now called HU-1A) utility helicopter and Vertol has flown its Model 76 tilt-wing VTOL. Vertol has also flown its Model 105 helicopter using twin T53s.

Doak Aircraft Co.'s Model 16 ducted fan and Ryan Aeronautical Co.'s VZ3RY (Model 92) deflected slip-stream—both VTOLs—are undergoing ground tests prior to flight.

In addition, the T53-L-3 turboprop version is slated for Grumman's AO-1 Mohawk twin-engine STOL observation plane.

Versatility of the T53 is illustrated by the Vertol Model 105 installation. The turboshaft power package —two engines coupled through a common gear box—can be exchanged with the Lycoming-built Wright R1820 piston engine package using the same mounts. No airframe modifications are necessary. Speed is increased 50% and payload 40%, Lycoming states.

LeRoy A. Howard, Lycoming's manager of sales and service, says the coupled T53s have lived up to all expectations and have experienced neither control nor inter-engine tolerance problems. Fuel control is by Chandler-Evans Co.

Another interesting version of the T53 is being developed for marine application. Installation will be in a high-speed boat being designed for the Navy by Miami Shipbuilding Corp.

The T53-L-1 started as a 600-shp engine; however, during development, power was increased to 720 shp and, then, to 825 shp. Experience with the 825-shp production engine should be greatly accelerated by a 1,000-hour tie-down test program which Bell hopes to conduct in the near future with the HU-1A. As a result of this program, Lycoming hopes to increase time between overhauls substantially above the present 50 hrs.

The T53-L-3, rated at 960 shp

takeoff, is running on Lycoming's test stands. Engine is expected to complete the 50-hour preliminary flight rating test in March or April of this year. Completion of 150-hour qualification testing is scheduled for March, 1959.

Both versions of the T53 have six stages of compression—five axial and one centrifugal—giving a compression ratio of 6:1 and an airflow of about 10 lbs./sec.

The annular combustion chamber, using a vaporizing fuel-air mixing system, is built around the single-stage compressor turbine. The free power turbine is connected with the forward-mounted, planetary reduction gear by means of a co-axial through-shaft.

The more powerful T55, equipped

Model of twinned turboprop T53s proposed by Lycoming.

with a Hamilton Standard fuel control, has been run a total of about 1,400 hours in test stand operation. This engine is very similar to the T53 in general layout. Main differences are two additional axial stages of compression and a two-stage compressor turbine.

T55 compression ratio is 6.2:1 and airflow is about double that of the T53. Experience gained in testing the T53 enabled Lycoming to give the T55 double the power with minimum increase in weight.

Both the T53 and the T55 are equipped with automatic anti-icing systems.

De-icing air flow to inlet struts and guide vanes is bled from the compressor through a solenoid valve. Solenoid valve is actuated by an anti-icing detector and interpreter. System has been qualified in tests conducted at Mt. Washington.

External combustion chamber configuration reduces length of engines without increasing overall diameter, gear box, fuel control, etc. being mounted on the compressor case.

Manufacturing techniques used by Lycoming in support of Army's program have resulted in considerable saving.

For the future, Lycoming is continuing to develop current engines. Company has proposed a new version of the T53-L-1 rated at over 1,000 shp. Also offered is a twinned version of the turboprop T53 (see photo).

Solar's YT66: Army's smallest turbine

by Richard van Osten

The design philosophy behind the Solar Aircraft Co.'s lightweight gas turbine for the Army is probably best described as "simplicity and its relationship to reliability."

Currently designated as the YT66 (Titan), the unit is quite similar to the Navy's YT62 except that the YT66 is a free turbine. Weighing about 50 lbs., the engine produces 55 shaft horsepower under military 100°F "hot-day" conditions. This is actually a down-rating from the unit's output in a standard day environment—about 70 shp.

Solar has not stated for what specific purpose the Army intends to use the YT66 other than "one-man helicopters and flying platforms." However, as the variable torque characteristics of a free turbine tend to make this type of engine more desirable in fixed-pitch applications and the Solar powerplant is primarily designed for vertical mounting, its ultimate use appears to be slanted more to a ducted-fan device. In this case, even its residual thrust of 12 lbs. would be some aid in VTOL operations.

The YT66 is small. It is approximately two feet in overall length, and 13 in. in diameter including the reduction gearing and basic engine accessories. Although only slightly smaller than the company's production-line, 50-hp Mars, the YT66 weighs about one-half as much.

Miniaturization of accessories has been one of the major problems in YT66 development and some work is continuing along these lines. Standard pumps, etc., that are off-the-shelf items, impose either a size or weight penalty, sometimes both. No special techniques are used in the 200 psi fuel pump, but extremely close tolerances are required in all aspects of the fuel pump and its accompanying system.

The tolerance and miniaturization requirements posed another hurdle in fuel-nozzle design, four of which are used in one test configuration, and six in another (final design is yet to be decided). Because the YT66 is designed to operate on standard automotive gasoline, which is more volatile than other turbine fuels, a small nozzle opening is required.

In keeping with the philosophy of "simplicity/reliability," Solar engineers decided against the use of tiny orifices in a scaled-down conventional nozzle and designed a set of spray nozzles from extruded stainless steel tubing normally used for hypodermic needles. This arrangement is said to be far less sensitive to plugging and foreign matter than the regular injector orifice.

The engine's fuel consumption will be about 10 gals. per hour at normal rated power. Non-leaded commercial fuels are preferred because of the possible buildup of combustion by-products in the turbine area. Another advantage of using automotive fuels is the elimination of the more complicated ignition system required by heavier oil fuels.

In overall design, the engine is about as simple a gas turbine as can be built, say company engineers. They describe the unit as a compromise between radial and axial flow designs. But it is rather unique in that a "split-off" exducer section of the radial turbine wheel also serves as the free turbine in a power section stage. This section transmits its power to the reduction section by means of a co-axial shaft through the compressor section.

The engine's pressure ratio is approximately 3.2 to 1 on a 100° "hot day," with a mass flow of about 1.2 lbs. per second under the same conditions, and engine revolutions at rated power are 56,700. Turbine inlet temperature at rated power is 1,450°F.

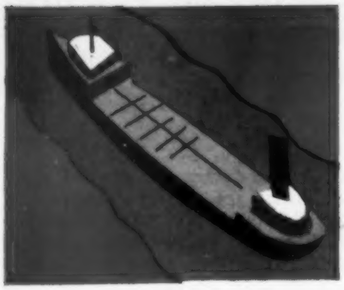
The engine's high turning speed is reduced to about 4,000 rpm by a gearbox that weighs only 11 lbs. There are only three bearings in the engine which are subjected to the maximum 56,700 rpm.

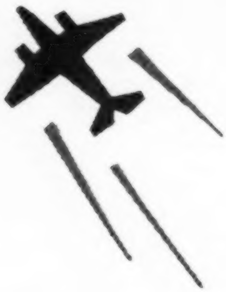
Starting the YT66 is accomplished by a handcrank which is tied into the gearbox. Ratio between the crank and the engine is 100 to 1. The engine will light off at about 10% rpm, but it is recommended that the crank be turned as an "assist" until 15% speed is reached. A system of foot-pedals for starting also has been considered.

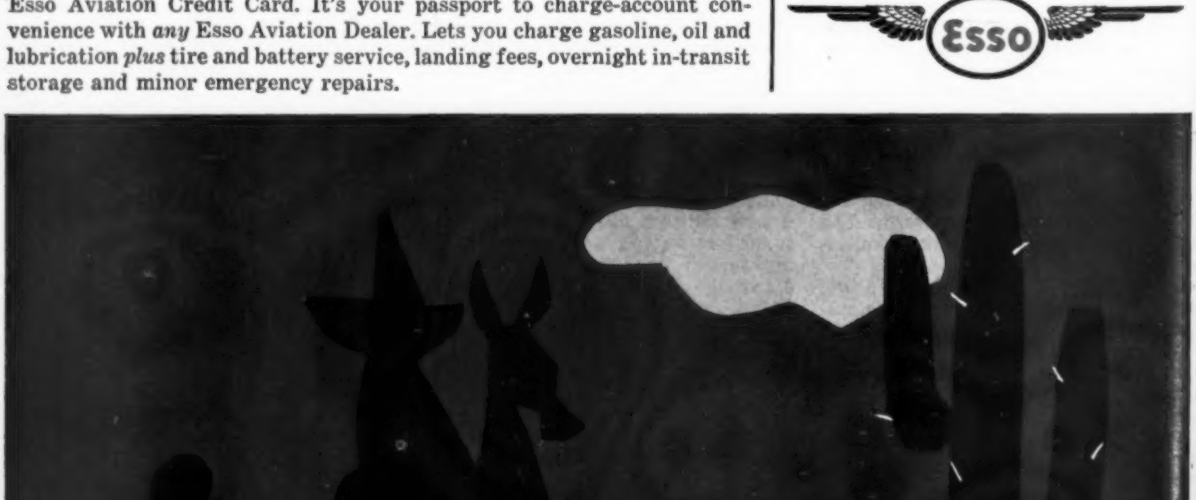
A tailpipe temperature probe and an actuator will be supplied with each engine to reduce engine loads when required. If temperatures become excessive, the probe signals the actuator which may then react as a control stick force or as a power-reduction device.

Cost has been a big factor in the YT66 planning. The engine is not considered to be expendable in any sense, but it is admitted that it is designed for a "somewhat shorter life" than other similar engines. Wherever possible, special materials have been avoided and have not been found necessary with Solar's approach in stresses and temperatures. However, the use of such materials in the future gives the basic design a chance to "grow" in rated output if it is required.

Solar engineers say that the engine could not have been built "two or three years ago." But they point out that component efficiency, particularly as applied to compressor and turbine design, has since advanced considerably.







Question marks punctuate aerial jeep program

by William Beller

THE MAKING of an aerial jeep for the Army is reminiscent of the early days of airplane design when every innovation, worthy or not, was treated as a divine revelation vouchsafed only to the inventor. Among the elements creating this atmosphere are the newness of the field, technical befuddlement, and a drifting aura of military security.

The aerial jeep program, which is being monitored by the Army Transportation Corps, was started in February 1957. The following July, $1.7-million worth of contracts were let to Aerophysics Development Corp. ($388,000), Chrysler Defense Engineering ($661,000) and Piasecki Aircraft Corp. ($653,000).

Aerophysics is using four ducted propellers in its design, which is called a "four-holer." On the other hand, Chrysler and Piasecki are using "two-holers." Specifications call for four of any of these vehicles to be stowable without excessive folding or disassembly into a C-130 aircraft.

With each company viewing the design problem differently, the Army hopes to come up with at least one successful flying machine by early next year. However, the service emphasizes that its program is a research approach.

No adequate theory

At the project's start, fundamental technical problems were apparent. For one, there was no adequate theory for the aerodynamic design of a shrouded propeller. And for another, control and stability were so little understood that design solution would have to await inspiration or be treated empirically.

Today, the means for controlling and stabilizing any of the aerial jeeps is held classified. This does not imply, though, that a successful means has now been found.

That the state-of-the-art has not advanced much over the 23 years that the shrouded propeller has been known, and that a trial-and-error design approach is probably the one being used, were conclusions stated by Hiller Helicopters' engineer Alvin H. Sacks at the January meeting of the Institute of Aeronautical Sciences.

Sacks said that "at present there is no known method for designing a shrouded propeller, even for maximum thrust." He added that "we cannot even say what the optimum length-to-diameter ratio of the shroud should be."

The problem becomes even more complicated when the ducted propeller operates in a non-axial flow. Angle-of-attack effects also must be considered. Compounding these are the interference effects of multiple-propeller jets.

The Army sees the aerial jeep doing just about everything the ground jeep is doing now. This includes reconnaissance, movement of commanders and messengers, medical evacuation, re-supply of frontline units, and moving small tactical elements.

Above all, the Army wants a vehicle that is easy to maintain. It is going to have to live with the troops under all types of field conditions, and if it turns temperamental or needs an engineer to fix it, then the service might as well stay with its land product.

In wartime, some tactical advantage is lost every time an aerial jeep has to set down to refuel. Thus, fuel economy is a rigid need.

Ideal vehicle far off

Ideally, the Army would like a vehicle able to fly all day without gassing up. But we are far from this ideal, and will be even further from it, in the endurance view, when turbine engines are used. Here, though, what we lose in endurance we gain in efficiency.

Larger fuel tanks are not the answer. The designers are boxed in by a small volume envelope, based on the C-130's cargo space, plus a gross weight limitation. Roughly, the jeep's weight will be 2,000 lbs., with half of this given over to payload.

The payload includes four soldiers and their equipment plus the fuel and oil load. Add armament, and personnel or range is forfeit.

The Army says that the aerial jeep must lend itself to pilots having no extensive flight training. In this way, every man on the platform will be able to perform a mission independent of the flight one.

Least important are the performance requirements. Fifty mph is pegged as sufficient, and no rate of climb value is given. However, the vehicle must be able to fly above the terrain. This means that the jeep cannot depend on ground effect for its lift.

Wanted, but now not feasible, is a flying jeep with ground mobility.

The ducted fan approach is being used because of the amazing agility shown by Hiller Helicopters' flying platform, which was built in 1954 for the Office of Naval Research. Later, the Army took the project over.

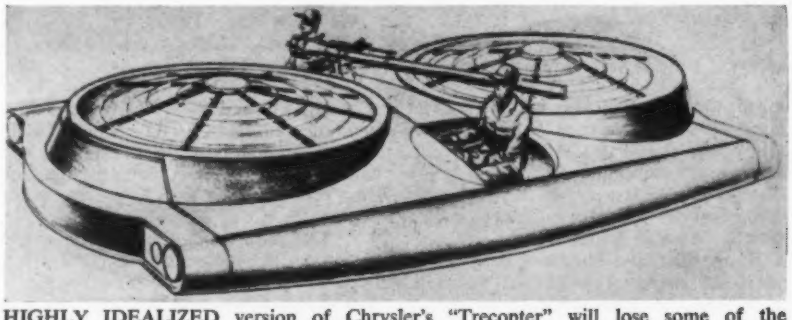
Unhappily, flight test of the platform showed that, at 22 feet per second forward velocity, the kinesthetic control of the pilot was not enough to overcome the vehicle's large nose-up pitching moment. Thus the platform's usefulness was severely limited.

Whether kinesthetic or mechanical controls were used, the Army realized that this control problem might wreck their project. The service, therefore, has gone to more than one duct, intuitively feeling that stability will be bettered. Other contemplated devices include automatic controls and helicopter controls, either together or separately.

Oddly enough, the Army derived its specifications for the aerial jeep from the operational drawbacks of the small helicopter. Field use showed the helicopter being difficult to operate in confined areas. Also, for reconnaissance work, the rotor gives the vehicle's position away.

Other minus factors: complexity, limited all-weather capability, platform not stable enough for armament, not easily transportable without disassembling, hard to operate near ground at night, and difficult to de-ice the blades.

The Army feels that success with any one of the three aerial jeeps would eliminate most of these problems. A four-holer is being made because it appears to offer the best chance for gaining stability and control. On the other hand, the two-holers are better for tactical purposes, are easier to use in confined areas and easier to transport because of their narrower width.



HIGHLY IDEALIZED version of Chrysler's "Trecopter" will lose some of the pictured ornateness in the final vehicle.

Although specific design details have not been released, this much may be presumed: Chrysler is using a simple and direct approach to the control problem. Conceivably, this could call

for some type of variable flap or slat arrangement in the ducts.

Frank Piasecki is drawing on his helicopter experience to design cyclic and collective pitch controls. Other devices may also be included initially to test their merit.

Aerophysics is relying on differential power inputs to the ducted propellers for control and stability. This method could not be used by two-holers because the gyroscopic effects would not cancel.

Chrysler's 'Trecopter'

A task force of about 50 engineers and draftsmen is designing Chrysler's aerial jeep, which the company calls a "Trecopter." Work is being done at Chrysler Defense Engineering in Detroit, headed by executive engineer Chester Utz. Project engineer Jack Gordon and assistant engineer Dr. Philip Lett are the top guides under Utz in the Trecopter's development.

The company expects to finish its control and stability investigation sometime this spring. This is Phase I of a three-phase program.

Windtunnel tests of a dynamic model start this month. To reduce wall effects, the engineers are using an open-throat tunnel, which was built in a large enclosed area. Distance from the bottom of the throat to the floor is 12 feet, a necessary minimum dimension.

Load-cell tests of a full-scale dynamic model are also plotted for this month. Work will run for at least several months, and the results will determine when tethered flights begin. However, the schedule calls for these flights to start in the fall.

Phase II will begin about the middle of May and will run for at least six months. This calls for delivery of two "pre-prototype" vehicles to the Army.

Phase III calls for a three-month period of free-flight demonstrations. These are scheduled to begin the latter part of this year and end early next.

In order to fit four aerial jeeps into a C-130, the vehicle's envelope is approximately 10 ft. by 20 ft. by 3 ft. From these dimensions, several conclusions can be drawn:

(1) There must be some folding, which undoubtedly includes the windshield and wheels.

(2) The shroud annulus is 3 ft. deep and will probably be used to store part of the fuel.

(3) Minimum dimensions of personnel platform are about 2.5 ft. by 10 ft., which leaves room for two 7.5 ft. propellers if shroud diameters are 1¼ ft.

Here are some preliminary design conclusions drawn by Chrysler engineers:

(1) A large lip on the duct gives good lift in hovering; but too large a lip gives a large nose-up pitching moment in forward flight.

(2) An optimum pressure distribution can be had in the duct if the propeller's angle of attack at 75% semi-span is increased, rather than decreased as in the ordinary propeller.

(3) A ¼-in. clearance between the duct and blade tip is adequate for aerodynamic and production purposes.

(4) The number of instruments on the cockpit panel will be close to zero.

Chrysler is using rigid rotors; that is, there is no blade flapping; the shaft is being designed to withstand the bending moment. To reduce blade fatigue and weight, the designers are calling for fiber-glass construction for the blades for the first Trecopter model.

The early models will use a single reciprocating engine, but engineers say they would go to a turbine engine if they could find one cheap enough and in the power range. However, they point out that they do not have any hope of finding such an engine in the near future.

The company's design philosophy is to build a machine that can be field-repaired by any man with slightly more training than an automobile mechanic. However, repairs will be minimum, the engineers say, because of built-in ruggedness. They also say the Trecopter will be as easy to fly as a light plane.

Production engineers are being introduced to the project now. During Phases II and III they will be playing increasingly important parts. Blueprints for the vehicle will be of a production type.

Utz said that his organization has been studying the aerial jeep problem for the past three years. He added that before the three-way competition for an aerial jeep design began, Chrysler had already financed and built a two-ducted-propeller model.

When asked if he thought his design would work, Utz answered: "It must work—it's the next mode of military transportation." He observed, though, that the cost of powerplants may prevent the machine from being as common as the ground jeep. But if engines are not figured in the cost picture, Utz said that "the Trecopter could be sold at about the same price as the ground jeep if bought in the same quantities."

Utz emphasized that Chrysler is "not interested in invading the aircraft industry." He said "our objective is to do a job in the defense effort" and pointed out that the Defense Engineering plant has been in constant operation since 1941.

"We have picked a flight regime between the helicopter and the ground for our work," he said. Thus, he continued, "Chrysler is not in competition with the helicopter industry or any other type aircraft industry."

Piasecki in the lead

The veteran helicopter engineer Frank Piasecki is heading his company's work on the aerial jeep. Backing him up are engineering vice-president Donald N. Meyers, design chief Frank E. Mamrol, dynamics chief Herbert G. Somerson and engineering adviser Elliot Daland.

Piasecki Aircraft appears to be several months ahead of Chrysler in the program. Phase I received Army approval back in January and Phase II was started then. Phase II calls for two prototypes to be built and delivered to the Army by September. Phase III work is scheduled to begin the latter part of this year, which is the same timetable that Chrysler has.

Under Phase I, Piasecki investigated the control and stability problem in a full-scale testbed mounted on a truck, which was instrumented for the purpose. Static tests were run with the truck stationary, and dynamic tests with the truck driven at speed along a runway.

In this way, the basic objectives of Phase I were completed and the final rotor designed. The company is now building the flying vehicle.

Background for the company's work is many hours of tunnel test time and theoretical calculations plus the design and testing of two completely different full-scale ducted-propeller configurations.

When questioned about the knotty control problem, Piasecki said: "We feel we have the control and stability problems licked for the speed regime in

MOCK-UP of Piasecki Aircraft's "Sky Car." Flying model is expected early next year.

which we will be operating." He added the unique opinion: "From our test data we have evolved new design concepts that indicate that the flying jeep does not have the limitation on high speed that a helicopter has."

Going a step further, Piasecki indicated that, through a method devised by his company for influencing the way the air jet flows through the duct, there is no theoretical limit to the subsonic speed attainable by a flying jeep.

Piasecki Aircraft sees the aerial jeep being piloted by men with about the same amount of flight training as a helicopter pilot. There is little hope for less training, the company believes, because the vehicle has the same number of degrees of freedom that the helicopter has and consequently the same number of flight problems.

The instrument panel, too, will be comparable to that on a helicopter with perhaps a few simplifications. Piasecki pointed out that the pilot cannot depend on the ground plane for navigation, particularly at night, and consequently will need instruments for VFR contact flight. A near-full instrument panel would be needed for advanced-type vehicles able to operate under all-weather conditions, he said.

Piasecki's jeep, called "Sky Car" by the company, will probably have a folding vertical stabilizer plus folding windshield and wheels. In this way, it will be able to be packed with three others into a C-130. To help decrease folded dimensions, Piasecki has made his duct of a plastic material that is air-inflated before flight. Whether this technique will be used on the final model has not been said.

Two engines will be powering both propellers. In the event of one engine's failing, the machine will be able to perform on the other. Reciprocating powerplants are being used, but Piasecki sees an eventual use of turbines.

This company, too, is looking for design simplicity, which Piasecki says is inherent in flying jeep designs. He pointed out that the powerplant is less complicated than that on an automobile, that the transmission system is easier to work with than a truck's, and that it is nowhere nearly as intricate as an automatic transmission.

He expects the market for flying jeeps to be far greater than that for small helicopters and light airplanes. He said that, "This is one of the greatest concepts in air vehicles in the history of aviation, and has the possibility of giving maximum personal service to the individual and to the military for true air mobility."

Although this hope is shared by the Army, the service is still eager to pursue any other line of attack that will give flying jeep capabilities. With this in mind, Colonel G. P. Senef suggested that people having other approaches to the aerial jeep problem get in touch with him at the Aircraft & Electronics Div., Office of Chief of R&D, Dept. of Army, Pentagon, Washington, D.C.

Aerophysics jeep to fly this fall 'right off company's parking lot'

SANTA BARBARA, CALIF.—Aerophysics Development Corp. is now going into hardware on its $388,000 utility vehicle contract from the Army's Transportation and Research Command at Fort Eustis, Va. First flight is scheduled to take place this fall.

Dr. Richard Vogt, manager of design at Aerophysics, looked out the window of his office in Santa Barbara, and gestured. "We'll fly it off our parking lot," he said.

Aerophysics was one of three winners in the Army design competition in which 21 companies were invited to take part. Although all three made use of the ducted fan principle, Aerophysics was the only one to use the more stable arrangement of four rotors.

Designer Vogt explains: "The helicopter component that gives rise to the greatest number of problems is the cyclic pitch mechanism. We avoid it. Instead, simple and well-developed variable pitch propeller hubs are used to control the vehicle. This arrangement provides powerful control over the pitch and roll motions of flight."

Any standard variable pitch propeller could be adapted to Aerophysics' vertical takeoff craft, Dr. Vogt says. Being a subsidiary of the Curtiss-Wright Corp., Aerophysics is equipping its prototype with two-bladed props produced by C-W's propeller division.

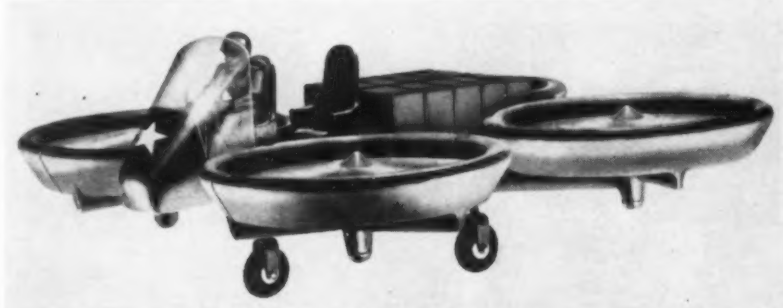
Instead of a reciprocating engine, Aerophysics felt that the large amount of power required strongly recommended a gas turbine as powerplant for its vehicle.

The Army's requirement in the competition, designed to flush out ideas for more efficient vertical flight, called for a vehicle weighing only 1,000 lbs., but capable of lifting a payload of 1,000 lbs.

With no U.S. engine available, Aerophysics turned to the French Turbomeca which powers the Alouette helicopter. It has already taken delivery on an engine through Continental Motors Corp., which has U.S. rights for the Turbomeca turbine line.

Dimensions, specifications, performance and other details of Aerophysics' machine are classified. But Dr. Vogt says flatly: "Our vehicle fulfills all of the Army requirements."

This means that Aerophysics has accomplished the design of an aerial vehicle in which half the gross weight



AEROPHYSICS DEVELOPMENT CORP.'S jeep will have four ducted fans surrounded by lift-increasing shrouds. A gas turbine supplies the power.

ARTIST'S concept of aerial jeep being developed by Aerophysics Development Corp.

is payload. Another requirement is that it be air-transportable, with measurements permitting four vehicles to be flown in a C-130. Aerophysics achieves this by folding the lift-increasing shrouds surrounding the propellers in much the same fashion aircraft wings are folded for carrier storage.

Aerophysics has devoted a large amount of windtunnel time to the development of its utility vehicle and plans to do more in working out continuing refinements in the design. It also has developed a training device to assist in training and checking out crews. Aerophysics feels this is a matter requiring attention because piloting of the craft will require considerable skill.

The basic problem of aerial vehicles of this type is that of stability and control. The forward shift of the vehicle's center of lift as it changes from hovering to forward motion and, similarly, the sideward shift in side motion, requires rapid application of large control forces. The period of dynamic oscillation is short and not much longer than the human reaction time. Pilots have to be sharp. This has become well known from experience with small helicopters.

Next step in Aerophysics' development program will be improving the vehicle's controllability so that the average man can fly it. This can be accomplished by various mechanical or electro-mechanical stabilization devices.

Basic experience of Aerophysics Development Corp. lies in the missile field, ranging from subsonic winged missiles to hypersonic ballistic research missiles. It was through a combination of circumstance and the initiative of its design department manager, Dr. Vogt, who has a broad background in aircraft design, that it branched out into the vertical takeoff aircraft field.

Another Curtiss-Wright unit received the invitation from the Army to submit an entry into what was then generally known as the "aerial jeep" competition. By the time the word passed along to Aerophysics—during the course of communication between the two companies on still another matter—Aerophysics had less than three weeks to study the requirements and prepare a proposal. Dr. Vogt took the requirements home to study over the weekend, and then went to work at his drawing board.

Aerophysics reports the main purpose in building the experimental vehicle is to gain experience and to find solutions for the problems encountered. The prototype is provided with seats and controls for two pilots and with an adequate platform area for the payload.

It is considered that the Aerophyics design can live within the nap of the earth better than most other types of VTOL vehicles, since its propellers are completely protected. This allows the operator to take advantage of natural cover for protection and for surprise of the enemy.

At Fort Huachuca

Electronics reshapes Army Aviation

by Henry P. Steier

FORT HUACHUCA, ARIZ.—Here at an outpost erected in 1877 for defense against a primitive enemy, the U.S. Army is starting to update its defense against a most sophisticated one.

Huachuca is the site of the U.S. Army Electronic Proving Ground (USAEPG). Established initially in the fight against renegade Indians, and after active use in the campaign against Geronimo, the Apache war chief, Huachuca was used intermittently until 1954.

Then, the USAEPG was established to fill a place in the current Army rush for aid from the newest technology—electronics.

Today the "Geronimo" cry of the paratrooper is symbolic of the large part aviation plays in Huachuca's work. Under the direction of the U.S. Army Chief Signal Officer, a big part of Huachuca's job is to evaluate aviation use and support of electronics for the present and near-future Army.

Advent of atomic warfare has moved aviation's place in the Army from "auxiliary" to "prime." Success and survival under the new circumstances hinge on the high mobility and better-than-jeep flexibility of air vehicles.

To accomplish its aviation-borne missions in the atomic age, Army is asking electronics to play a dual role. In one role it is needed for operation and survival of the aircraft. In the other, many of the aviation-supported missions will be accomplished electronically.

Under the general staff of Huachuca's commanding general, Brig. Gen. Ralph T. Nelson, six technical departments carry out the electronics work. These are: (1) aviation, (2) signal communications, (3) combat surveillance, (4) electronic warfare, (5) meteorological, (6) combat developments.

USAEPG's aviation department effort is in two areas. One is program development and equipment procurement that will fill Army aviation's immediate future needs for capability to fly from one place to another. This planning is done by Army pilot-engineers with support from civilian engineers.

The other is to provide the air platforms needed to carry out tests on equipment being evaluated by USAEPG's other technical departments.

Huachuca's aviation department emphasizes it is serving "tomorrow and not the long-range future." This is to clarify what sometimes appears to be an overlap and duplication of effort between the Army Aviation Board at Fort Rucker, Ala. and Huachuca.

When the Rucker Board was set up 2½ years ago it was given authority for developing future equipment concepts for the new aviation-borne Army and carrying them through procurement and evaluation.

The critical state of Army aviation affairs, however, left insufficient time to go through the R&D, evaluation and procurement cycle for the Army's immediate needs.

Huachuca's aviation department has been given the interim job during which it is taking off-the-shelf items from industry to determine their capability of serving Army needs in the so-called interim period 1960 to 1965.

As originally set up, Army aircraft electronics planning listed these problem and program areas, and timing for development:

1956-1960
Ground based nav-aids
Multiple flight instruments
Unstable helicopters

1960-1965
Doppler navigation
Integrated flight instrumentation
Stability for helicopters
Controlled air traffic

1965—and beyond
Inertial navigation
Contact analog instrumentation
Automatically programmed flight

For the present-to-1965 period, it is expected USAEPG will be heavily engaged in filling the equipment gaps with modified off-the-shelf equipment.

During the 1960-1965 period it is also expected that the Army Signal Engineering Laboratories will step in as supplier of advanced interim developments coming mostly from contracts with industry.

During this period Huachuca's role in the development picture may gradually change to become more of a support organization for the other departments at USAEPG.

One of USAEPG's jobs is to evaluate performance and modifications on radio and nav-aids now standard in Army aircraft.

Standard nav-aid of the present Army is low and medium frequency ADF. The standard tactical radio-transmitting and receiving system for voice communications is the ARC-44 FM system with 280 channels in the 24-51.9 megacycle band.

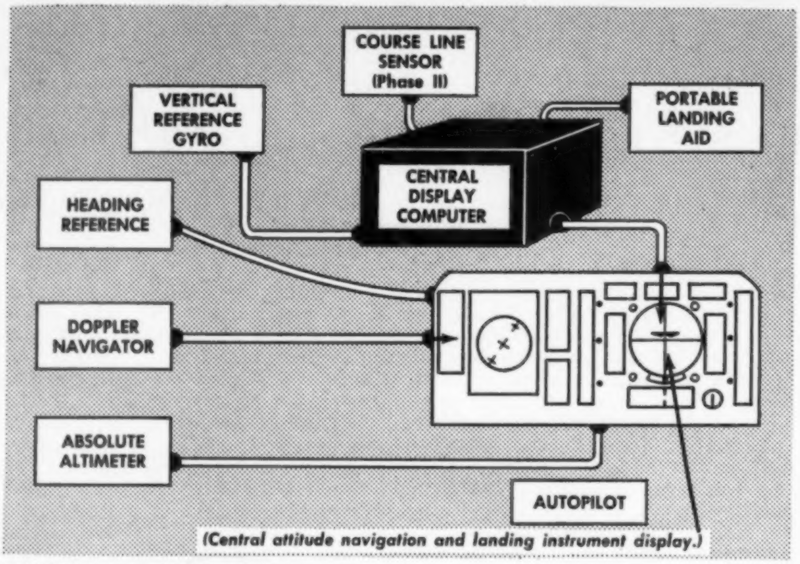
In addition to the communications facility, ARC-44 provides a homing function when used with an accessory antenna system AN/ARA-31.

This allows the pilot to determine bearing on a ground radio tuned to the same frequency.

Ultimate goal of Army aviation, however, is to unchain itself from ground based nav-aids. Growth of enemy countermeasures and detection capability will require radio silence in a combat zone.

First step in the Army program to minimize tell-tale radiations was to start work on a system that radiates over only a small area. This was known as Whispering Satan (Self-contained

ARMY AVIATION is stressing Doppler navigation systems for "interim" 1960-1965 period. Even lightest-weight systems such as Ryan Aeronautical Co.'s model 103 shown here installed in L-20 "Beaver" are too heavy and occupy too much space.



DURING "INTERIM" PERIOD Army expects to use these elements for its aircraft navigation and let-down system with integrated instrumentation.

Automatic Tactical Air Navigation). Official name recently was changed to SCAN (Self-Contained Automatic Navigation).

The plan calls for development of rotary-wing and fixed-wing SCAN systems.

It includes with the Doppler sensor: (1) ground speed and drift instrument, (2) bearing and track instrument, (3) hovering instrument (helicopter only), (4) gyro-stabilized magnetic compass, (5) integrated flight attitude instrument, (6) dead reckoning position indicator.

Outstanding among the design problems faced in development of Army's aviation electronics are weight and size. Even the smallest, lightest equipment available from Air Force developments cannot fit the Army's aviation equipment demands.

To gain initial experience with Doppler, USAEPG has been testing Ryan Aeronautical Co.'s Doppler navigator Model 120 for helicopters and Models 103 and 108 for fixed-wing aircraft. Although the lightest Dopplers in the business, they are far from satisfactory for field use in the 1960-1965 period.

Huachuca has ordered procurement of 10 experimental SCAN units from Ryan as prime contractor. These will be installed in L-20, H-19 and H-34 aircraft. Deliveries were expected to start in third quarter of fiscal year 1958.

Three of the new devices to be tried out as part of SCAN's integrated instrumentation panel are vertical scale indicators, an integrated flight attitude instrument and a dead-reckoning position indicator, and a hovering indicator.

Vertical scale instruments probably will be initially procured as take-offs from Air Force Wright Field's development of such instruments.

The integrated flight attitude instrument will be a five-inch circular unit. On it will be shown pitch, roll and turn information. A heading ring around the instrument will operate as the gyro compass indicator. Similar instruments have been developed under the Air Force integrated instrumentation program.

The hovering instrument will be a cross-pointer display working from Doppler-derived information. It will show vertical velocities and lateral movements.

Dead reckoning position indicator will present a display of the aircraft's ground position on a circular plotter 8 in. in diameter. A light "bug" representing the aircraft will move across rectangular coordinates to display position and motion. Different map scale ratios will be provided to take care of different ground detail requirements.

In addition to the requirements listed for the interim SCAN instrumentation system, a contract was issued to Emerson for development of an absolute altimeter known as AN/-APL-100. It is believed information from the APL-100 will be part of the instrumentation system. The altimeter is designed for high accuracy and has a range of 0-3,000 ft.

Overall performance requirements expected of the final interim SCAN system probably will be much higher than is now available in self-contained systems. General attitude of Army aviation engineers is that needed "resolution" of dimensional points on the ground differ from Air Force requirements by many orders of magnitude.

Full development of the Doppler SCAN system is expected to take three to four years. At this time contracts for improvement and modification of SCAN concepts have been issued and more are being prepared.

The aviation department is, however, going to try out an off-the-shelf inertial system in 1958. A development of Litton Industries, the system is not expected to be anything more than a tool for trying out some inertial ideas.

New mobility of Army warfare has brought with it the concept of air-transportable packages of communication equipment.

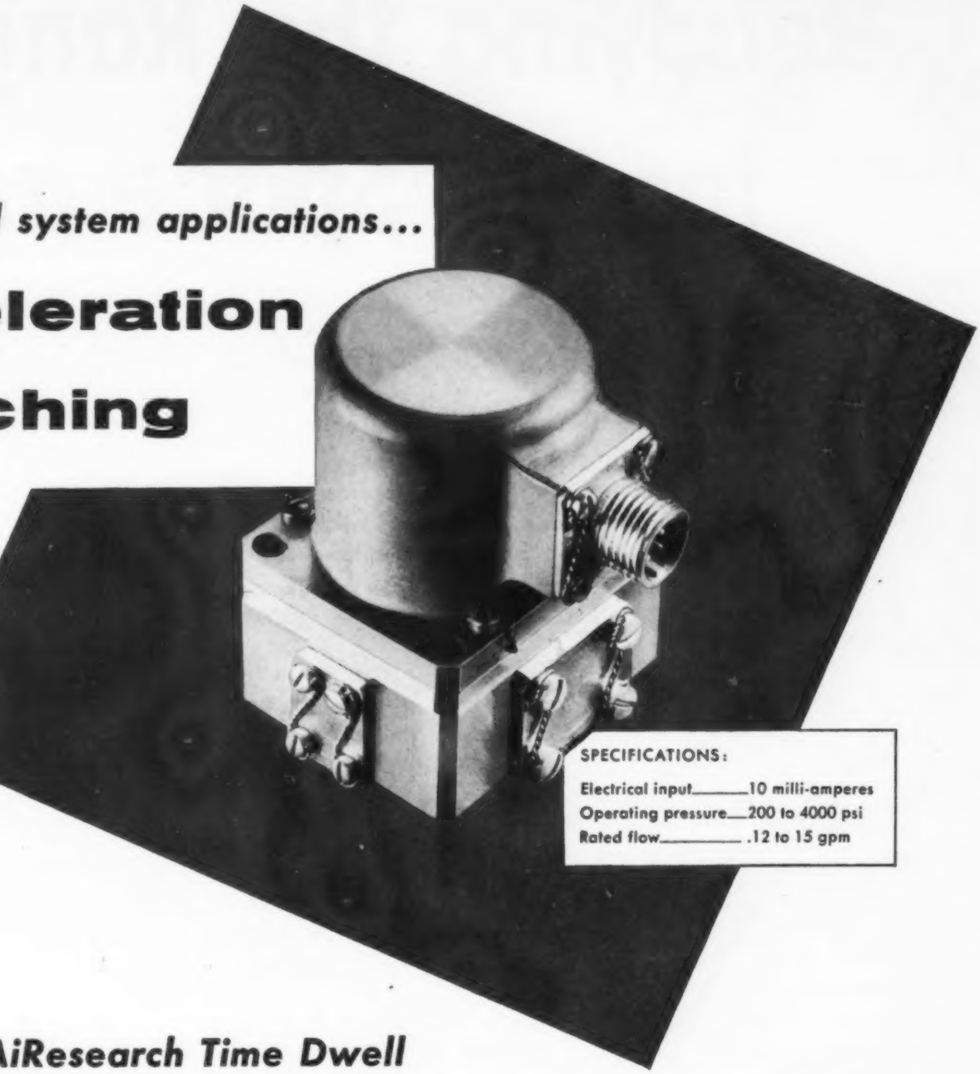
Army operation with many separated groups has in turn put a heavier burden on communications necessary for tactical use of the groups.

Solution to this is the support helicopters can give by carrying terminals and relays for quick establishment of line-of-sight communications.

Heavy emphasis is put on trials

For control system applications...

acceleration switching



SPECIFICATIONS:

Electrical input	10 milli-amperes
Operating pressure	200 to 4000 psi
Rated flow	.12 to 15 gpm

New AiResearch Time Dwell Servo Valve overcomes performance and reliability limitations of present hydraulic control systems

Acceleration switching is a new control technique which provides for positive control of spool velocity, allowing the servo system engineer to achieve resolution, reliability and response previously unattainable. Significant advantages include:

- Unimpaired operation in contaminated oil
- Less than 5% null shift between –20°F and +700°F
- Infinite resolution
- High spool control forces (≅ 100 pounds) at *all* signal levels
- High pressure gain (10 times linear valve)

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THE GARRETT CORPORATION

AiResearch Manufacturing Divisions

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Circle No. 109 on Reader Service Card.

of these systems of USAEPG with the aviation department providing the platforms for the work.

In a typical case, an H-34 helicopter might be used to place communications center and terminal equipment on each side of a mountain. To establish contact between them, another helicopter, the H-21, would be used to carry a relay station to the mountain top.

There it would serve as a common line-of-sight relay between the terminals.

In an operation of this type, the H-21 might be used in a two-fold mission. Because of the urgency of establishing communications it might carry a set of relay equipment within the aircraft. This would allow the vehicle to serve as the relay station in transit and until the hut containing the relay was dropped.

Equipment cited meets only the minimum requirements of a group commander. It provides four voice channels, one teletype channel operating on speech, plus a duplex circuit and a switchboard for local wire lines.

Weight reduction of the equipment is a problem to be solved. Miniaturization with printed circuits is needed. The huts bearing the equipment need to be made lighter. Huts represent a big part of the total weight because they must have strength to carry the heavy, old-fashioned communications gear being used. USAEPG engineers said a 3 to 1 weight cut is needed.

Improved air-transportable tropospheric scatter terminals for communication hops to 150 miles were recently announced by Collins Radio Co.

Wire-laying revived

Despite its ancient vintage, wire communications still play a big part in Army planning. Idea of wire-laying by aircraft started in Italy in World War II and was tried in Korea.

The idea was dropped but picked up again in 1957 at Huachuca. It now has a relatively high priority. Atomic bomb tests have shown that nuclear effects on communication are serious. It takes from 5 to 20 minutes for ionization effects of the blast to wear off. During this period radio and radar systems will not work.

Tests at Huachuca show single-line wire can be laid at 60 miles an hour. However, the need is for many channels on one line, which requires cable-laying. So far this has been unsuccessful because no feed device is available to dispense the cable without breakage. Part of the trouble is cable strength.

Under development is a twin-coaxial cable for frequencies up to 2-3 megacycles. Using carrier techniques, this could carry many channels of information.

Engineers on this project say industry could make a big contribution by developing a dispensing system for

the cable. Using an H-34, 60 miles of the new cable could be carried.

Work of the combat surveillance department at Huachuca covers the same function as did the gas-filled observation balloon of the Civil War.

In the modern Army this involves use of both aircraft and drones. Fixed-wing and rotary-wing aircraft and drones are used by CSD at Huachuca to run trials on old and new methods of getting pictorial information about an enemy's territory or one's own front lines.

Photography, television, radar and infrared methods are being tried for interim and future use.

Under development for aircraft and drones is a high-resolution TV system that will work under moonlight conditions. Bids were put out recently on this system which has 800 lines resolution at the camera, with 600 lines overall for the system.

The TV operates in the 700-900 megacycle region in an FM mode to eliminate interference and propeller modulation of signals. Radioplane is the prime contractor on the new TV which weighs less than 94 lbs.

Drone tracking

A novel plotting board "tracker" has been developed for controlling the drone. Using a map on which targets are spotted, a point of light is "flown" manually over the map surface. Radio controls linked to the light-operating device control the drone's position.

Other tests are under way to fly the drones on a computer-programmed basis. Some work has been done on a programmer for straight line flying and return, but the new system which is classified will get the drone over a desired area and determine deviations from course to arrive at the target.

Side-looking radar (SLAR) for surveillance is under test at Huachuca using an Aero Commander. The classified system was developed at the University of Illinois and given to Motorola at Phoenix, Ariz. for construction of 10 units.

Its function is to map a wide swath of ground territory using photographic film exposed to the radar display tube. The tube combines pictures taken by antennas on each side of an aircraft.

Electronic warfare department at Huachuca uses aviation for supplying platforms to carry countermeasures equipment.

In addition meteorological missions are flown by the aviation department in support of general requirements of the other departments.

Combat development department at Huachuca is essentially a paperwork "thought" department which does not deal very much in hardware. As with its counterpart at Fort Rucker, it is a "far-future-looking" organization which conducts studies on matters such as communications mobility, air traffic control, etc. in the 1975 period.

At Fort Monmouth

Army electronics geared to 1965 . . . plus

FORT MONMOUTH, N. J.—Aviation electronics here at the U.S. Army Signal Engineering Laboratories is the newest offspring of Army's effort to update its aviation planning.

At the USASEL Hexagon building, work on aviation electronics was just recently given its own identity. Prior to 1953 this work was hidden under department work in the fields of radar, radio, etc.

After that an avionics division was formed as part of the communications department. When effort in this field was realigned recently a surveillance department was formed from what was formerly known as Evans Signal Laboratory of USASEL.

Surveillance department is now composed of avionics, communication and components divisions. Avionics is organized into navigation and flight aids, aircraft communications, drone aircraft systems and aircraft prototype installations branches.

Emphasis in avionics is on 1965-and-beyond requirements. Although R&D for that future period is stressed, the aviation department at USAEPG and USASEL now supplement each other's efforts. Each might procure interim developmental equipment.

Newness of the effort in aviation electronics means each must take what is available off-the-shelf to determine suitability for service testing or further development.

The missions of avionics, according to its acting technical director, Lester M. Lang, will be accomplished by "development work in the house, outside contract, or getting the equipment from the other services." Bulk of USASEL's avionics work is now being done by outside contract on a multi-source bid basis.

Dr. Harold A. Zahl, USASEL's director of research, told AMERICAN AVIATION the "facts of automation, cost and light weight need are forcing research" for Army aviation electronics.

The closer an aircraft can stay to the ground, he said, the better is its chance for survival. This puts a severe test on instrument capability.

For its surveillance missions, Zahl said Army interest goes down to the individual soldier. This means the Army has a resolution problem with its TV, camera and infrared devices.

The high concentration of Army aircraft in a limited airspace during combat operations means some tactical system of air traffic control is an absolute necessity.

In a tactical situation Army airfields and heliports will appear in a few hours. Communications, terminal navaids, en route flight aids and landing aids will be in one place today and another tomorrow.

Avionics communication branch has developed on a crash basis a flight operations center van to provide ATC, warning air defense identification and in-flight assistance.

Interim plans for ATC will be tied to ADF, homing, ground radar navigation aids, marker beacons and FM voice communication. Anticipated great increase in communications load in this period will be met by the AN/ARC-54 transistorized receiver under development to replace the ARC-44. This work is being done by Collins Radio Co.

ARC-54 will weigh about 25 lbs., including the homing system as used in the ARC-44. It will have 800 channels with 50-kc spacing as contrasted to the 200 channels spaced 100 kc in the ARC-44. Also, the new set will have a visual display for homing.

Looking beyond to the 1965 period, a much higher capacity communications set ARC-51 is under development as a joint Navy-Signal Corps project. Full specifications on this unit are classified, but it is known to have 1750 channels spaced 50 kc and will weigh 29 lbs. It is being developed by Collins.

Some type of data link is thought necessary for either ATC purposes or reconnaissance reporting. USASEL expects to evaluate a Bendix system which calls the roll of up to 100 aircraft in 17 seconds.

Typical information Army wants to send is destination, altitude, speed, identification by number, information on whether a target is available under instrument flight or visual flight rules, and heading. This would be done on a pushbutton basis. Trials of the "Labil" system are under way to do this.

Extensive activity is under way on a marker beacon development. Latest is the R-737-ARN designed by Radio Corp. of America for tactical use. It weighs 1 lb. 3 oz. and is completely

transistorized. It is a single-light system but can be converted to a three-light device by means of an adapter with identical dimensions (3-7/8 x 5 x 1¾ in.).

A unique ground-based marker beacon using the radio-active isotope Cobalt 60 is being considered. Radiation from the material would be confined to project a cone of radiation vertically from the ground. A shutter type device would key the radiations similar to the code used for the 75-mc marker beacon. A scintillation counter in the aircraft would detect the signals.

The radioactive device would be either dropped by parachute in a tactical area or carried by a paratrooper. Temporary tactical airways could be established or ground locations spotted by the beacon.

Planning for communication-navigation equipment in standard aircraft includes provision for the APX-30 IFF transponder, ARC-55 and -60 UHF AM radio, ARN-30 VHF omni-range receiver and in some cases the R-746/AR glide slope receiver.

With this equipment, Army aircraft would be capable of flying within the common system of ATC in the U.S. No consideration is being given to use of the Tacan system for navigation. Army says it will try to stick with low- and medium-frequency ADF for combat use until the self-contained system comes along.

Nav-aid branch

Big project under way in avionics' nav-aid branch is the interim Doppler-operated navigator with integrated instrumentation. The most advanced development in this program is being done by Sperry Gyroscope Co. as prime contractor.

Sperry is developing the AP/APN-118 that is planned for the period beyond 1960. Objective is to come up with a complete system only half as heavy as any known system today, and which can be adapted to different types of Army aircraft. Weight goal is believed to be 100 lbs.

Work on the system started a few months ago. At this time the design is progressing on a system which could be applied for complete carriage in rotary-wing or fixed-wing aircraft, or partial carriage of sub-portions in minimum systems.

Basic instrumentation will be a flight director with attitude display, gyro compass, distance to destination, ground track and drift angle, deviation-from-course pictorial indicator. It may also include a terrain-clearance indicator, using data from the absolute radio altimeter being developed.

Some of the APN-118 features include lightweight instruments, transistorization of radio circuits and ac power supplies, and integration of all system pieces for weight reduction. Example of such integration is inclusion of some computer circuits in the instruments themselves. Advanced design, lightweight gyros will also be used.

PETER J. LA MARCA, chief, aircraft communications branch, avionics division, U.S. Army Signal Engineering Laboratories, examines Army's present basic ARC-44 air-ground FM communications equipment. Weight of 280-channel system is about 25 lbs. New ARC-51 system being developed jointly by Navy-Signal Corps will have 1750 channels with same weight.

A system known as "Silent Satan," because it involves no radiating elements, is the long-range responsibility of USASEL. It will have contact analog instrumentation coupled to inertial navigation and automatic flight control systems, and give capability for programmed flight.

Contact analog instrumentation is the long-range goal of the joint Army-Navy Instrumentation Program (ANIP) for which Douglas Aircraft Co. at El Segundo, Calif. is the prime contractor. Work is both for fixed- and rotary-wing aircraft.

Bell Helicopter Corp. is serving as industry coordinator of the helicopter part of ANIP under direction of the Office of Naval Research.

With the new instrumentation the pilot will receive terrain and sky in-

formation needed for control on a thin, flat plate, transparent television tube mounted as a windshield. A circular TV tube mounted horizontally will provide navigation information. The flat tube is being built by Kaiser Aircraft and Electronics Corp.

Work on the inertial portion of the SCAN navigation system is under way at USASEL. A contract has been given to M. Ten Bosch, Inc., Pleasantville, N.Y. for a lightweight inertial system. Work on the low drift, free gyro system was started a year ago and has two years to go.

Long-range objective in ATC is to allow aircraft to fly where they wish in a combat area. Contact analog method is essentially equivalent to flying under visual flight rule conditions where ATC control is at a minimum.

Under interim period conditions Army planning includes provision of a limited collision warning device for its aircraft. To improve capability in this field, two study contracts are under way. Melpar Corp. is working on a pictorial view device that shows a simulated display of ground and air objects. The other study is on a Ramo-Wooldridge Corp. device that indicates collision course and steering information to avert it.

COMBAT AREA air traffic control tower. Two-part tower is airlifted by H-21 helicopters and can be set up by two men in 30 minutes. Top unit is new lightweight Helicop-Hut made by Craig Systems, Inc. Aluminum and plastic materials keep Helicop-Hut weight below 2,500 lbs.

Provision of automatic stabilization for Army aircraft is an important part of interim and long-range planning. Present high pilot fatigue factor in controlling helicopters seriously limits his ability to do anything other than fly the aircraft.

Sperry H-34 and H-37 and Lear L-23 automatic pilots are under evaluation at USAEPG and USASEL. A USASEL spokesman said Lear's fixed-wing system "seems best for the interim period."

However, a new and yet unannounced helicopter autopilot developed by Sperry is expected to give strong competition to existing systems. This is a "five-channel" system which controls pitch, roll, yaw, collective pitch, and rotor rpm. Such systems are often referred to as "five axis" systems. Autopilot designers appear to favor the "channel" idea.

First use of the Sperry system will be made in Vertol 44 helicopters. A modified system has been sold to the Army for test.

Objective of USASEL is to obtain a system which has universal capability for fixed- and rotary-wing aircraft and drones. It will have navigation couplers. Future systems will also have flight programmers to guide the aircraft from point to point over a prescribed route. Contracts for this advanced system are in the negotiation stage.

Majority of advanced drone work is clothed under heavy security wraps—some of it technical and some political. From the limited information available there is strong indication the Army is playing down its drone work mostly because of interservice rivalries.

Drone research and development is carried out under the drone aircraft systems branch of the USASEL avionics division. Chief of this branch is G. V. Ceres, responsible for sections of work covering airframes and guidance, telemetry and control, guidance and stabilization and preliminary analysis.

Ceres said drones pose more problems than missiles to locate and identify. The Sperry-Air Force Cytac hyperbolic navigation system is being studied by the nav-aids branch of avionics with a view to its utility for Army navigation.

A Bendix-Decca system has been evaluated at USAEPG. USASEL said Decca "appears to be useful." Cytac is being considered "because of high accuracy." Both these systems could have capability for drone guidance.

Another new development with possible drone application is infrared side-looking radar for terrain mapping. Haller-Raymond Brown, State College, Pa. is doing this work.

Installations branch of the avionics division at USASEL furnishes electronics installation engineering information to airframe manufacturers for new aircraft or retrofit programs.

Army staff elements in the avionics department work at USASEL include an Army airfield and aircraft at Monmouth County airport near the Hexagon, and military personnel in an advisory capacity to chief of the avionics division. Chief of the avionics military staff is Lt. Col. Earl E. Bobo, Jr.

Activities at the Monmouth airport support USASEL with vehicles for tests requiring close liaison with avionics department activities, and supplement this type of work done at USAEPG.

How to do business with the Army

A guide for contractors

MOST contractual Army Aviation activities are actually carried on by the seven Army Technical Services. The chief of each technical service is responsible for items in his own area, whether research and development, or procurement, production, storage, maintenance and supply.

Overall supervision of logistic activities is exercised by the Deputy Chief of Staff for Logistics. The Chief of Research and Development has overall supervision of research and development activities.

The Director of Army Aviation in the Office of the Deputy Chief of Staff for Military Operations has coordinating responsibility of all aspects of Army Aviation. The Chief of Transportation is responsible for the conduct of research and development for Army aircraft and allied equipment.

Complete aircraft are normally developed with Army funds through the Air Force or Navy, as determined by the Department of the Army.

The prospective contractor should get in touch directly with the particular Technical Service listed below (or one of its field commands) appropriate to his activity.

Technical Services Directory

Corps of Engineers
Chief of Engineers
Department of the Army
Washington 25, D. C.

Signal Corps
Chief Signal Officer
Department of the Army
Washington 25, D. C.

Ordnance Corps
Chief of Ordnance
Department of the Army
Washington 25, D. C.

Transportation Corps
Chief of Transportation
Department of the Army
Washington 25, D. C.

Quartermaster Corps
The Quartermaster General
Department of the Army
Washington 25, D. C.

Chemical Corps
Chief Chemical Officer
Department of the Army
Washington 25, D. C.

Army Medical Service
The Surgeon General
Department of the Army
Washington 25, D. C.

There are four steps the prospective contractor should take:

1. *Consider your proposal*—The principal items and activities listed in this guide will illustrate the broad and specific fields of Army Aviation and help determine whether your proposal comes within the program.

2. *Identify your proper contact*—Under the listing of Army Service items and activities below are given the name of the Technical Service concerned and the name and address of the field command which awards contracts for procurement or research and development of the item or activity.

3. *Prepare and forward your proposal*—As far as feasible, include all the following information in your first letter:

a. *Organization information.*

(1) Name and type of company.

(2) Total number of employees; also totals of specialized personnel appropriate to your proposal.

(3) Facilities—brief description of facilities available.

(4) Clearance—if you have had "facility clearance" from the Army, Navy or Air Force, state which.

(5) Background—brief outline of work done previously in field of your proposal.

(6) Descriptive brochure and financial statement if available.

b. *Clear and full discussion of proposed work in terms of objectives and scope.*

Should you have no specific project to propose, but merely want to list your company as a candidate for future work that may develop in your field, this information, along with the organizational information

outlined above, will be welcomed by the appropriate Technical Service.

4. *Arrange to submit a bid or proposal for a contract*—Contractors are selected on the basis of experience, adequacy and facilities, skill and availability of personnel, quality of workmanship, plant organization and other factors, as well as on price. Some Army contracts result from competitive negotiation rather than from advertising and bids.

If your proposal or bid is accepted, a contract may be negotiated or awarded between your organization and the appropriate Technical Service or field command. Details regarding type of contract, calculation of overhead or indirect costs, capital equipment to be furnished by the Army. special stipulations pertaining to contract termination, labor regulations, patent rights and other factors will be discussed and worked out between you and the Army agency.

If your proposal is not accepted, the Government is, of course, not obligated in any way to reimburse you for any costs which you may incur in submitting a proposal or attempting to arrange a contract.

There are seven broad categories of procurement, production and research and development in Army Aviation. These categories are:

1. Airframes
2. Engines
3. Instruments
4. Avionics
5. Accessories
6. Ground Handling and Terminal Equipment
7. Aircraft Research Studies and Investigations.

NOTE: *Contract offices are shown (1) for research and development and (2) for procurement, production, maintenance, supply and service. Latter is listed in each case as "production" to distinguish it from R&D.*

I Chemical Corps

Accessories

Dispensing equipment for smokes and aerosols.
Pilot CBR protective masks.

(For Research and Development)
Col. Lloyd E. Fellenz
Commanding Officer
U.S. Army Chemical Warfare Laboratories
Army Chemical Center, Md.
Phone: EDgewood 1000, Extension 27120

(For Production)
Lt. Col. John G. Appel
Commanding Officer
U.S. Army Chemical procurement District, New York
290 Broadway
New York 7, N. Y.
Phone: BArkley 7-0800

Ground handling equipment

Ground handling and servicing items for smoke and aerosol dispensing equipment.

(For Research and Development)
Col. Lloyd E. Fellenz
Commanding Officer
U.S. Army Chemical Warfare Laboratories
Army Chemical Center, Md.
Phone: EDgewood 1000, Extension 27120

(For Production)
Lt. Col. John G. Appel
Commanding Officer
U.S. Army Chemical Procurement District, New York
290 Broadway
New York 7, N. Y.
Phone: BArkley 7-0800

II Corps of Engineers

Accessories

Aerial mapping.
Aerial surveying.
Target acquisition.

(For Research and Development)
Mr. Donald L. Lilly
Purchasing and Contracting Officer
U.S. Army Engineer Research and Development Laboratories
Fort Belvoir, Va.
Phone: SOuth 5-7700, Extension 20240

(For Production)
Col. F. O. Diercks
Commanding Officer
Army Map Service
6500 Brooks Lane
Washington 25, D. C.
Phone: OLiver 4-4350

Ground handling and terminal equipment

Metal and plastic landing mats.
Mobile test laboratories for concrete, asphalt and soils.
Soil stabilizers.
Trafficability.

(For Research and Development)
Col. Andrew P. Rollins, Jr.
Director
Waterways Experiment Station
Vicksburg, Miss.
Phone: Vicksburg 3-3000

(For Production)
Col. Jay A. Abercrombie
Commanding Officer
U.S. Army Engineer Procurement Office
226 Jackson Blvd.
Chicago 6, Ill.
Phone: ANdover 3-3600

Construction and maintenance equipment.
Electrical equipment.
Firefighting equipment.
Infra-red.
Liquid fuels distribution—pipes, pipelines and accessories, storage tanks.
Materials for construction and equipment.
Pneumatic tools.
Pumps.
Trailers, and semi-trailers.

Turbines, gas.
Water purification equipment.
(For Research and Development)
Mr. Donald L. Lilley
Procurement and Contracting Officer
U.S. Army Engineer Research and Development Laboratories
Fort Belvoir, Va.
Phone: SOuth 5-7700, Extension 20240
(For Production)
Col. Jay A. Abercrombie
Commanding Officer
U.S. Army Engineer Procurement Office
226 West Jackson Blvd.
Chicago 6, Ill.
Phone: ANdover 3-3600

III Ordnance Corps

Accessories

Jatos, using extruded and cast double-base propellants.
(For Research and Development)
Col. I. O. Drewry
Commanding Officer
Picatinny Arsenal
Dover, N. J.
Phone: FOxcroft 6-0711
(For Production)
Brig. Gen. Joseph M. Colby
Commanding General
Ordnance Ammunition Command
Joliet, Ill.
Phone: JOliet 7-1711
Jatos, except propellants.
(For Research and Development and for Production)
Maj. Gen. H. N. Toftoy
Commanding General
Redstone Arsenal
Huntsville, Ala.
Phone: JEfferson 6-4411

Ground handling and terminal equipment

(For Research and Development and for Production)
Transport vehicles.
Maj. Gen. N. M. Lynde, Jr.
Commanding General
Ordnance Tank-Automotive Command
1501 Beard St.
Detroit, Mich.
Phone: VInewood 3-9600
Linking and delinking machines.
Target material.
(For Research and Development and for Production)
Maj. Gen. William K. Ghormley
Commanding General
Ordnance Weapons Command
Rock Island, Ill.
Phone: Rock Island 8-5651
Automatic aircraft weapons, all calibers.
Belt links and clips; up to and including 30mm.
Feed mechanisms.
Flash hiders.
Machine guns, up to and including 30mm.
Mounts for machine guns.
(For Research and Development and for Production)
Col. D. G. Ludlam
Commanding Officer
Springfield Armory
Springfield 1, Mass.
Phone: REpublic 9-6911

IV Quartermaster Corps

Accessories

Clothing, hot and cold weather.
Footwear.
Handwear.
(For Research and Development and for Production)
Maj. Gen. Webster Anderson
Executive Director
Military Clothing and Textile Supply Agent
Philadelphia Quartermaster Depot
Philadelphia 45, Pa.
Phone: HOward 5-2000
Rations, in-flight.
(For Research and Development and for Production)
Maj. Gen. H. R. McKenzie
Executive Director
Military Subsistence Supply Agency
226 West Jackson Blvd.
Chicago 6, Ill.
Phone:
Aerial delivery equipment.
Fuel and lubricant dispensing and handling equipment.
Mobile and base petroleum laboratories.
(For Research and Development and for Production)
Brig. Gen. H. A. Hall
Commanding General
MIPR Liaison Office
Columbus General Depot, U. S. Army
Columbus, Ohio
Phone: DOuglas 1811

V Signal Corps

Instruments

Communications.
Electromagnetic spectrum.
Electronic countermeasures.
Light, propagation phenomena).
Radar.
Sound.
Thermionics.
Ultrasonics.
Electronic Components.

(Continued on page 84)

Avionics

Automatic and remote control.
Autopilot systems.
Communications.
Drone control.
Navigation.
Identification.

Accessories

Combat surveillance sensors (photo, infra-red, radar, television).
Electronic countermeasures.
Radar.
Radio communication.
Radio direction finding.
Television.

Ground handling and terminal equipment

Meteorological instrumention.
Radar.
Radio direction finding.
Radio and wire communication.
Television.
Traffic control.

(For Research and Development)
Lt. Col. James E. Foster
Commanding Officer
Laboratory Procurement Office
U.S. Signal Supply Agency
Fort Monmouth, N. J.
Phone: EAtontown 3-1000, Extension 8000

(For Production)
Col. E. L. Littell
Commanding Officer
U.S. Army Signal Supply Agency
225 South 18th St.
Philadelphia 3, Pa.
Phone: KIngsley 6-3200, Extension 8000

VI Army Medical Service

Accessories

First aid kits.
Litters.

(For Research and Development)
Col. A. P. Thom
Chairman
Armed Services Medical Materiel
Standardization Committee
23rd & E Streets, N. W.
Washington 25, D. C.
Telephone: LIberty 5-6700, Ext. 63723

(For Production)
Chief
Supply Division
Office of the Surgeon General
Room 2835
Main Navy Building
Washington 25, D. C.
Telephone: LIberty 5-6700, Ext. 63115

VII Transportation Corps

Airframes

Airframes and configurations.
Structural materials of all kinds for aircraft.

Engines

Aircraft powerplants.

Instruments

Aircraft components.

Accessories

Aircraft accessory equipment and systems.

Aircraft research, studies and investigations

VTOL/STOL aircraft.
Slow speed aerodynamics.
Helicopters.
Operational research in aviation systems.

(For Research and Development)
Assistant Chief of Transportation for Research and Development
Building T-7
Washington 25, D. C.
Phone: LIberty 5-6700, Ext. 55480

(For Production)
Col. H. L. Phyfe
Director of Procurement and Production
U.S. Army Transportation Supply & Maintenance Command
St. Louis 2, Mo.
Phone: MAin 1-6426, Ext. 603 or 604

Miscellaneous Notes:

Contractors who are uncertain as to where to place a specific inquiry should write one of the following offices:

On matters of purchasing or procurement of standard products or components

Procurement Information Center
Office of the Deputy Chief of Staff for Logistics
Department of the Army
Old Post Office Building
12th and Pennsylvania Ave.
Washington 25, D.C.
Phone: LIberty 5-6700, Ext. 63231

On matters of supply, maintenance and service

Commanding General
U.S. Army Transportation Supply and Maintenance Command
12th and Spruce Streets
St. Louis 2, Missouri.

On matters of research and development

Technical Liaison Office
Office, Chief of Research and Development
Department of the Army
Washington 25, D. C.


5005


SNARK
USAF

WEST COAST TALK

by Fred S. Hunter

Lockheed 'covering all bases' with its twinjet JetStar, but still needs a military order to start production

LOCKHEED SHOULD HAVE the second prototype of the UCX JetStar flying by the end of this month. The Air Force is now making Phase II evaluations with the No. 1 airplane at Edwards Air Force Base.

The prototypes currently are twinjets. Each is powered by two TJ37 Orpheus prototype engines supplied by Curtiss-Wright.

But Lockheed is covering all the bases with the JetStar. It has both General Electric J85 and Fairchild J83 engines on order for four-engine conversions later on in the game (AMERICAN AVIATION, Feb. 24, p. 14). Commercial buyers will be able to specify the power they prefer.

But right now, the JetStar is strictly a military project. Unless there's a military order to start it off, Lockheed has said it can't afford to put the aircraft into production.

The original general operating requirement in the UCX off-the-shelf competition called for four engines. No change has been made in this Air Force requirement. But this isn't stopping Lockheed from a vigorous effort to sell the Air Force on the twinjet configuration—or the Air Force from making an evaluation, as per the Phase II tests it is now conducting at Edwards.

In other words, Lockheed is striking while the iron's hot. In its twinjet configuration, it has the only airplane flying. If it has to wait for the opportunity to demonstrate the JetStar with four engines—in 1959—some of its rivals, McDonnell, for example, may be catching up with it. And the twinjet job, we might add, is showing up in fine style in the flight tests to date.

Convair has a turbofan transport project on the fire, but isn't discussing it publicly. "It's only some lines drawn on a tablecloth at General Dynamics," said one executive. But other reports hint that actual proposals for a turbofan model of the 880 for delivery in mid-1961 already have been presented to airlines. The engine would be a new version of the J79 called the X220. It incorporates an additional stage in the turbine which turns a fan. General Electric is said already to have an engine running. It would up the thrust of the J79 by some 20 or 25% and improve the specifics by about 10%. The latter feature, of course, is what makes the ducted fan principle so attractive to airlines. Convair also is said to have drawn some lines on a twin-jet turbofan configuration at a gross weight of around 100,000 lbs. for short-range operation. This would come later on.

North American Aviation got the go-ahead on the X-15 in December, 1955. So, if the airplane flies in December this year, it would be about three years in the making. There are three versions of the X-15, each designed to explore different areas. The first one is designed for the job up to 250,000 ft., the second to 500,000 ft., the third to 750,000 ft., or so we hear. No. 2 and No. 3 will be ready in 1959, not far behind the first one.

Lockheed's F-104 was accepted into an Air Force operational unit for the first time Feb. 20, so Aug. 21 is the date the airplane will become eligible, under Defense Dept. rules, to try to break the official world speed record now held by the McDonnell F-101. Since the Air Force describes the F-104 as "the highest and fastest aircraft in the Air Force inventory," it should be able to do it.

Orders for power packages to be built by Rohr Aircraft for the C-130B—new version of the Lockheed Hercules—are projected to reach five airplane sets a month by the middle of summer . . . AiResearch's new "clean" room for testing small or high precision equipment has lights flush with the ceiling (so they cannot gather dust), benches and tables that hang from the wall (no dust catching legs or corners) and a filtration system that removes particles one four-millionth of an inch in size.

American Airlines, we hear, has decided it might as well have combination cabins in starting service with its Boeing 707 jets. Sign of the times. And don't be surprised if those combination interiors include four abreast (two-and-two) seating, very deluxe, for the standard fare portion of the cabin, rather than the previously advertised five abreast, along with six abreast (three-and-three) for the tourist section.

LOCKHEED ELECTRA

BASIC DESIGN OBJECTIVE:

Economically Sound- for "Turbine-Age" Short-to-Medium Hau Airline Operations!

Why Emphasis on Sound Economics?

The Airline Enigma—"Profitless Prosperity"

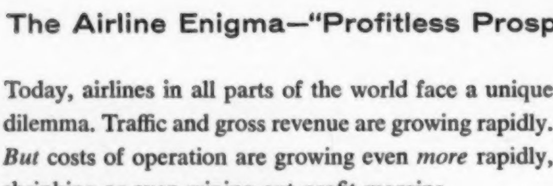
Today, airlines in all parts of the world face a unique dilemma. Traffic and gross revenue are growing rapidly. *But* costs of operation are growing even *more* rapidly, shrinking or even wiping out profit margins.

Airline directors, management, banking firms and g ernment agencies are confronted with this problem a time when airlines face monumental *new capital c* in re-equipping for the turbine-age.

The Importance of Sound Aircraft Economics

Passenger-airplane economics involve two interacting groups of factors: (1) First costs, flight and maintenance costs, overhead. (2) The airplane's payload and revenue potential at pre-fixed rates.

This relationship establishes the relative profitability of any airplane.



However, analysis of an airplane's relative profitab is valid only when these economic factors are applie the specialized "use and environment" in which it operate.

Airline "uses and environments" divide into three b patterns. The clearly defined "long haul" and "sh haul"...and the less clearly defined "medium haul"

"Short-to-medium hauls" generate 35% to 65% of the world's air traffic. However, overhead and operati costs are relatively higher in this area because of shor flights, comparatively more time spent on the grou *and* higher passenger unit overhead.

Yet profit or loss in "short-to-medium haul" operati determines over-all airline financial success!

SAM SAINT SAYS

AMB to spend millions on brass spangles for the harness on the horse . . .

AIRWAYS MODERNIZATION BOARD'S first and most important contract to start "modernizing" the airways has been signed. AMB is withholding details of what is proposed, but enough is known to allow some preliminary comment. What is known is not encouraging.

Since the early years of air traffic control, penciled notations on racks of paper strips have characterized the horse-and-buggy nature of the still existing ATC system. Most students of the growing ATC dilemma have assumed the first step in "modernizing" ATC would eliminate the paper strip with its hastily scratched and sometimes misread notations. Apparently that is not to be.

A peek behind the curtains, where AMB is arranging the scenery for the first act, reveals tentative plans for keeping the "Flight Progress Strip" in the center of the stage. To be sure, these paper strips will be dressed in bright new trappings. They will be machine-printed, outward evidence of a complex array of modern gadgetry out of sight in the wings. The quality of paper used may be better. No doubt the room lighting will be the best that science can produce. But, at this writing, the spectacle (or specter) of controllers sitting in front of racks of paper strips is expected to remain.

At about the time proposals for a data-processing and display system were being submitted to AMB, a top policy official of the General Precision Laboratory, Inc. told this reporter the GPL proposal was built around retention of the "Flight Progress Strip." We made a mental note, rating GPL's chance of winning the contract at something less than zero. Surely the physical limitations of paper strips would reduce the associated machinery of modern technology to helpless, fuse-blowing frustration.

We were wrong, however, in estimating the probability of an AMB contract for GPL. By some process of reasoning not yet visible to the naked eye, AMB chose the GPL proposal above all others. Whether the AMB staff lacked the courage to depart from the time-honored strip system, or lacked the foresight to visualize how paper strips will gum up the works in a mechanized environment, we don't know. We know only that present indications point toward racks of flight progress strips for many years to come.

So maybe we should take a closer look at the paper strips that will control argosies of jets in the wild blue tomorrow. The controller will sit at a control board similar to present day boards. The familiar racks of paper strips will be there. *But no pencil!* In its place is a keyboard on the desk. The controller dare not pick up a pencil to change the posted data in any significant way. The computer (the electronic brain of the new system) needs to know every move that is made. So the controller, to change a posting, must become a button-pusher. He uses the keyboard on the desk to tell the system what needs to be done. A mechanical arm with a writing head then rises out of the desk. It stops by the proper strip, prints its new information, then crawls back out of the way.

Take the simple matter of recording a pilot's report vacating an altitude. Today the controller simply draws a pencil line through the altitude number on the proper strip. On the GPL ouija board *the controller will push a minimum of 9 buttons to tell the machine what airplane, whose strip is in which column and row on the rack, is vacating what altitude.* This operation will take maybe 3 or 4 times longer with the fancy new equipment. And hitting the right buttons carries life and death responsibility.

A requested change of routing is likely to take the button-pushing controller several times longer. When the unhappy pilot needles for an answer, the even less happy controller is likely to reply: "Stand by! We are having an attack of progress down here. Things will take longer from now on!"

Another problem is vitally important. One of the obsolete committees of yesterday allowed as how you couldn't coordinate the information on standard flight progress boards with the radar information so essential in today's operation. This column would like to know by what magic the GPL proposal solves this awkward but inescapable problem.

Certainly some rudimentary time and motion studies should precede the spending of millions in tax dollars.

Help Wanted

LETTERS

Another near-miss

To the Editor:

The following is from Marvin Miles' Skyways column in the Feb. 16 *Los Angeles Times*.

Confusion of lights is one of the pilot errors blamed for accidents, reports Dr. Neil Warren of the SC School of Aviation Safety. This theory has been advanced by some as a possible reason why a MATS transport and Navy Neptune collided recently over Norwalk.

To point up such a possibility here is an excerpt from a letter by Bill Busch, a private pilot, relating his near miss with an airliner:

"I was enjoying the lights of the city," he writes, "when I noticed the landing lights blaze forth on a commercial airliner apparently on a converging course with me. I didn't see him but obviously he saw me. The point is this: The running lights of an aircraft against the background of a well-lit city are quite obscure. The quick thinking of the airline pilot in my case may well have averted another of the tragic collisions occurring all too frequently lately. I would like to suggest that all commercial planes leave their landing lights on while climbing out or descending in the metropolitan area." *B. C. ANDERSON, private pilot, Los Angeles.*

Links CAB and Administration

To the Editor:

Your editorial blast at CAB, (AMERICAN AVIATION, Feb. 10) was great but don't you feel a little frustrated attempting to expose weakness where there is no strength?

Editorially you say, "We suspect CAB would be hard put to it to explain in a formal hearing how all this came about."

When you wrote the above, sir, did you realize how many times the implementation of the above would cause not only embarrassment to that august body but to the Administration itself?

We 15-year co-pilots in Pan Am would like to see a little change. Patience is a great virtue. Unfortunately, after 15 years on the right side I find myself less and less able to afford it.

In your next editorial relating to CAB would you explain to the learned gentlemen the meaning of "convenience and necessity" and who should benefit thereby? Thank you. *T. W. ALDERSON, Seattle.*

AD INDEX

EN ROUTE

by Wayne W. Parrish

Air Marshal turns tables on a journalist

ONE OF THE outstanding men I met in Australia last March was Air Marshal F. R. W. Scherger, Chief of Air Staff, RAAF, whose engaging and infectious personality wins all my votes. His mind is sharp and faster than an orbiting satellite.

I was one of his first callers the day after he was appointed Chief of Air Staff for a three-year stint and, after a good talk in his offices in Melbourne, he gave a luncheon in my honor in a private dining room at Scotts Hotel attended by a batch of top brass in Australian air matters. (I am told that this was the first time the Air Board had ever hosted an affair honoring a journalist, so I felt quite honored.)

A bush country boy, Air Marshal Scherger is a career officer, now 54. He's been an outstanding pilot since the 1920s and knows an awful lot of Americans from World War II days. He was commander of the No. 10 Operational Group in New Guinea in 1943. He was awarded the DSO for his leadership as task force commander of the Allied Air Forces in attacks and landings at Aitape and Noemfoor. A broken pelvis put him out of operation in 1944 but he returned next year as Air Officer Commanding, First Tactical Air Force.

He knows the U.S.A. quite well, having served in 1951 as head of the Australian Joint Services Staff in Washington. He likes Americans; at least is polite enough to say so, and from my standpoint it would be a rare American who didn't shine up to this energetic Aussie. He is a born leader.

At the lavish luncheon, which ended with remarks by both the Air Marshal and myself, were men known to many Americans, including Air Vice-Marshal E. C. Wackett, Air Vice-Marshal H. G. Acton, Air Vice-Marshal C. D. Candy, Air Commodore Frank Headlam, A. B. McFarlane, secretary to the Department of Air and the senior civil servant of the department, and Frank Mulrooney, Assistant Secretary-General, Department of Air. And I should most certainly mention a new-found friend in Melbourne, Stanley Brogden, director of public relations for RAAF, a fine bloke who was of great assistance to me.

I had arrived in Melbourne at a high moment as far as RAAF equipment was concerned. Reports were being published that Australia was planning to acquire Lockheed F-104s and Lockheed C-130s, the latter for supplying Malayan bases. (Later the government decided not to get the F-104s.)

Looking to the U.S. for military aircraft may not seem to be out of the ordinary for most of you readers of this page, but believe me, in Australia, it was a sentimentally painful decision for the Commonwealth to break the long procurement tradition with Great Britain. I had arrived just as the public was being cushioned for the shock, although the fact is that the fears of many rock-bound U.K. adherents have not been justified.

This was at a time when Suez was an active subject. Australia's military people knew only too well that continued dependence on the U.K. was a risk for their country since the Middle East supply line could be cut at any time. Australia, out of necessity, had to look to the U.S., and had been doing so for commercial aircraft for quite some time. I have rarely heard anyone as articulate on any given subject as was Air Marshal Scherger on this one.

On the day of the Air Board visit and luncheon, I also managed to squeeze in a briefing at the Department of Supply, which operates the Woomera missile range, and visited the two major aircraft plants on the outskirts of Melbourne.

These two visits were pretty sad. The government aircraft factory was producing a limited number of Jindivik guided missiles but virtually nothing else. The Commonwealth Aircraft Corp. was finishing up the last of its line of Avon-powered Sabrejets, the last of its own three-place trainers, and the last of an order for Avon engines. Both plants had reduced personnel substantially, both had rather grim outlooks at the time.

So rapidly has aviation evolved that it's a very rough deal for a country of limited manpower and technical skills and resources, and so far away from major supply sources, to keep abreast of the major nations in aircraft design and production. In fact it's impossible. The government had about decided to devote its financial resources to acquiring specialized aircraft types from abroad rather than to subsidize heavily its own aircraft industry which was impossible to diversify to any major extent.

As I was winding up three days of briefings, tours, luncheons, dinners, receptions and all manner of hospitality, I found myself in a curious situation with Australian National Airlines. The officers gave me a cocktail party in the main offices, then we went out for dinner—and the place turned out to be the Chevron restaurant where I had been earlier in the week with Ansett Airways officials.

Now what does one do about it? Tell your hosts that you had already seen the floor show? Tell them (after they had reserved a good table) that I'd prefer someplace new? No, you decide to be a very polite guy and say nothing, and you enter the Chevron as though you had never seen it before, you praise the menu (which was good) and you laugh at the same jokes you had heard a few nights earlier, and applaud at the right places. As a matter of fact, I really liked the second visit as much as the first. It was a good evening, and much appreciated.

WWP with the Australian Chief of Air Staff, RAAF, Air Marshal F.R.W. Scherger, in latter's office in Melbourne. On table are models of Lockheed F-104 and C-130.